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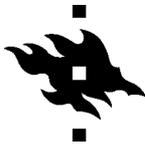
THE ROLE OF GOVERNANCE IN URBAN SUSTAINABILITY TRANSITIONS -CASE EKO-VIIKKI

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<p>Cities are responsible for many of the current environmental changes in the world. Even though the need for urban sustainability transitions is apparent, city governments have been, so far, incapable of governing the change. In this thesis, the possible urban transition and its multi-level governance is examined through the case example of Eko-Viikki neighbourhood and the urban planning changes around it. The framework of multi-level perspective on socio-technical transitions (MLP) is used for the analysis. This theory on transitions is widely used, while criticized for its inadequate conceptualization of the regime (the dominant system) and its spatial application, especially in cities. Traditionally, the framework has not been used to study transitions in cities, due to which, there is a lack of case examples of urban sustainability transitions and their governance. This thesis addresses the deficiency in question and aims to find out which types of policy instruments could be essential in bringing about urban sustainability transitions and whether the dominant regime, in this case the urban planning of Helsinki, can actively influence the steering of the transition.</p> <p>The materials of this thesis consist of two different sources. The document analysis was used to gather the materials for the policy instrument analysis. In addition, six semi-structured expert interviews were conducted to provide supporting material for it, as well as to examine the change of the urban planning context in Finland. The materials were analysed by qualitative content analysis using the MLP framework and a commonly used environmental policy instrument classification as a frame.</p> <p>The results indicate that regime actors can have endogenous power to somewhat steer the urban sustainability transitions. The regime actors of urban planning of Helsinki were active in the Eko-Viikki project, and sustainability issues have become more integrated part of the everyday urban planning in Helsinki. As for the niche level of Eko-Viikki, regulation and collaboration related policy instruments were the most successful in advancing the sustainability issues. In fact, the site transfer conditions containing sustainability demands as well as the area working group method have been scaled up to the use of the regime. The city of Helsinki has, moreover, committed in advancing sustainable city development through international agreements and its own city strategies. As regards the landscape level, the land use and construction legislation changes have remarkably tightened the requirements for sustainability of urban planning, especially for the energy efficiency. On the contrary, the lack of certain types of instruments seem to remarkably hinder the urban sustainability transitions. According to the results, information related instruments need to be developed to make the most of the technical solutions available and, ultimately, to make urban planning more like continuous learning processes rather than individual projects. Also, the issue of short-term profit seeking should be addressed by economic instruments that involve long-term investments and set sustainability issues as a first priority.</p> <p>All in all, it can be concluded, that much has done for promoting sustainability in urban planning of Helsinki even though a profound urban sustainability transition cannot be said to have happened. Particularly, systemic and process focused policy instruments are needed to take into account the multiple different stakeholders involved, and the governance levels where urban sustainability transitions take place. The urban sustainability transitions can be enabled only together with other governmental bodies of the city, state, construction companies, maintenance companies and, ultimately, residents.</p>			
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<p>Kaupungit ovat nykyään vastuussa suurimmasta osasta maailman ympäristömuutoksista. Vaikka tarve kaupunkien kestävyysmuutokselle on ilmeinen, kaupungit eivät ole tähän mennessä kyenneet ohjaamaan muutosta. Tässä pro gradu -työssä mahdollista kestävyysmuutosta ja sen monitasohallintaa tarkastellaan Eko-Viikin asuinalueen tapaustutkimuksen ja sen ympärillä tapahtuneiden kaupunkisuunnittelun muutosten kautta. Viitekehystenä käytetään monitasohallinnan teoriaa (multi-level perspective). Tämä sosioteknisiä muutoksia tarkasteleva teoria on laajalti käytetty, mutta myös kritisoitu riittämättömästä regiimin (vallitsevan toimintajärjestelmän) käsitteellistämisestä sekä sovelluksesta kaupunkiympäristöihin. Viitekehystä ei ole alun perin käytetty kaupunkien kestävyysmuutoksen ja sen hallinnan tutkimiseen, joten tapaustutkimusesimerkkejä ei sen vuoksi juurikaan löydy. Tämän tutkimuksen tarkoituksena on keskittyä kyseisen puutteen korjaamiseen. Erityisenä mielenkiinnon kohteena on se, minkä tyyppiset poliittiset ohjauskeinot olisivat oleellisia kaupunkien kestävyysmuutoksen aikaansaamisessa sekä voiko vallitseva regiimi, tässä tutkimuksessa Helsingin kaupunkisuunnittelun järjestelmä, aktiivisesti ohjata muutosta.</p> <p>Materiaaleina tässä tutkimuksessa käytettiin sekä asiakirjoja, joista kerättiin tietoa käytetyistä poliittisista ohjauskeinoista, että myös asiantuntijahaastatteluja, jotka mahdollistivat syvällisemmän tiedon saamisen ohjauskeinojen toimivuudesta. Lisäksi näistä kuudesta puolistrukturoidusta haastattelusta saatiin tietoa kaupunkisuunnittelun kontekstin muuttumisesta Suomessa. Analyysissä käytettiin kvalitatiivista sisällönanalyysia, jota raamittivat monitasohallinnan viitekehys sekä yleisesti käytetty ympäristöalan jaottelu poliittista ohjauskeinoista.</p> <p>Tämän tapaustutkimuksen tulokset osoittavat, että vallitsevan toimintajärjestelmän toimijoilla voi olla jossain määrin valtaa ohjata kaupunkien kestävyysmuutosta. Helsingin kaupunkisuunnittelun toimijat olivat aktiivisesti mukana Eko-Viikin projektissa, ja sittemmin kestävyyskysymykset ovat tulleet yhä enemmän osaksi kaupunkisuunnittelun arkipäivää. Eko-Viikissä sääntelyyn ja yhteistyömalleihin liittyvät ohjauskeinot olivat onnistuneimpia kestävyyskysymysten edistämiseksi. Nykyään tontinluovutusehtoihin liitetyt kestävyyskriteerit sekä aluesuunnitteluryhmä yhteistyömallina on otettu osaksi Helsingin kaupunkisuunnittelun toimintamalleja. Helsingin kaupunki on sitoutunut kestävä kehityksen edistämiseen myös kansainvälisten sopimuksien ja oman kaupunkistrategian kautta. Lisäksi maankäyttö- ja rakennuslain muutokset ovat vuosien mittaan kiristäneet kaupunkisuunnittelun kestävyysvaatimuksia, erityisesti energiatehokkuuden suhteen. Tietyn tyyppisten ohjauskeinojen puute voi toisaalta merkittävästi hidastaa kaupunkien kestävyysmuutosta. Tulosten perusteella voidaan todeta, että tiedollisia ohjauskeinoja täytyy kehittää, jotta teknologisia ratkaisuja voidaan hyödyntää parhaalla mahdollisella tavalla. Tiedonkulun parantaminen ja yhteistyön korostaminen on tärkeää myös sen kannalta, että kaupunkisuunnittelu toteutettaisiin enemmän jatkuvan prosessin, kuin yksittäisten projektien tavoin. Niin ikään tulisi lyhyen aikavälin tuoton tavoittelun sijasta kehittää taloudellisia ohjauskeinoja, jotka kannustavat pitkän aikavälin panostuksiin ja kestävyyskysymysten asettamiseen prioriteetiksi kaikessa kaupunkisuunnittelussa.</p> <p>Kaiken kaikkiaan voidaan todeta, että perustavanlaatuinen kestävyysmuutos ei vaikuta toteutuneen Eko-Viikissä ja Helsingin kaupunkisuunnittelussa, vaikka kestävyyskysymykset otetaan yhä paremmin huomioon. Erityisesti prosessinomaisuutta ja järjestelmät kokonaisvaltaisesti huomioonottavia ohjauskeinoja tarvitaan, jotta kaupunkien kestävyysmuutoksessa voidaan ottaa huomioon kaikki sen sidosryhmät ja hallinnon tasot. Kaupunkien kestävyysmuutoksen aikaansaamiseksi tarvitaan laaja yhteistyötä kaupunkisuunnittelun toimijoiden lisäksi myös kaupungin muiden hallinnollisten elimien, valtion, rakennusyritysten, isännöinti- ja huoltoyhtiöiden sekä asukkaiden kesken.</p>			
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Forewords

This thesis was conducted as a part of a research project called “Miten kestävyysmuutos toteutuu kaupungissa-esimerkkinä Eko-Viikin asuinalue Helsingissä” (KEMUT). KEMUT research project examined the sustainability transition, in other words the process towards more ecologically and socially sustainable future, through the case example of Eko-Viikki neighbourhood. The possible transition was examined through temporal comparison in the practical, policy and personal level changes. This thesis focused on the policy level changes in examining the relevant urban planning policy instruments. The research was carried out in cooperation with University of Helsinki and Metropolia University of Applied Sciences as well as the practical level partners of the City Executive Office of Helsinki, HELEN Oy and Viikki-Seura. Research was funded by Helsinki Metropolitan Region Urban Research Program (KATUMETRO).

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1 INTRODUCTION

The importance of cities is growing as already over half of the world's population lives in urban areas (UN, 2014). At the same time as urbanisation proceeds globally, the demand for basic resources and services, such as energy, food, water and waste management, concentrates in cities (Loorbach & Shiroayma, 2016). Increasing demand for resources and services means that cities are responsible for many of the environmental impacts in the world. Globally, cities produce 70 % of carbon emissions and account for 75 % of world energy consumption (Eames et al., 2013) and almost 75 % of resource consumption (Madlener & Sunak, 2011). Since these environmental impacts are predicted to increase until the end of the century, urban areas face the challenge of creating habitable living environments while simultaneously decreasing environmental degradation (Loorbach & Shiroyama, 2016).

In order to address this unsustainable development, profound sustainability transformations are needed in the cities (O'Brien & Sygna, 2013). Nowadays, the challenge of urban sustainability is well recognised by city governments, which initiate ever more ambitious agendas and programs for mitigating climate change and addressing other environmental issues (Frantzeskaki et al., 2017). Increasing amount of practical applications around sustainable urbanism have emerged since the early 2000's, especially focusing on the concept of 'eco-city' (Joss, 2015). Nevertheless, sustainable urbanism contains a variety of similar concepts such as 'eco-city', 'low-carbon city', 'smart city' and 'resilient city' that are sometimes used interchangeably with each other (Joss, 2015). These concepts all have different underlying emphasises (Joss, 2015), eco-city being the most exhaustive. The other concepts focus more on specific features of the city, such as resilience.

The conceptually diverse "umbrella concept" of eco-cities is carried out in wide variety of practical initiatives (Jabareen, 2006; Joss 2011 & 2015), that describe well the wide range of possibilities to enact urban sustainability transitions. Eco-city initiatives range from neighbourhood or district, to a town or a city, and to even urban-regional scale (Joss, 2015). Development types include new neighbourhoods or cities built from scratch, urban infill developments of existing built-up areas, as well as "retrofit" developments transforming the existing urban areas to more sustainable ones (Joss, 2011). Implementation of these sustainability initiatives has mostly been executed through technological innovation, especially focusing on energy technologies (Joss, 2011). More holistic sustainability planning integrating technological, environmental and social aspects, has been addressed in a little less than one quarter of the initiatives, and only a few cases have focused on community involvement and civic activity (Joss, 2011).

As it is in cities where varieties of different sustainability initiatives take place, they have even been described as hotbeds for innovation and experimentation, places where novel urban sustainability solutions can emerge (Loorbach & Shiroyama, 2016). However, it should be noted that city governments do not, necessarily and automatically, seize the opportunity of changing the urban areas and lifestyles to more sustainable ones by top-down planning and regulation (Loorbach & Shiroyama, 2016). So far, city governments have been unable to govern the change process into profound and systemic sustainability change (Loorbach & Shiroyama, 2016). Since no sustainable city yet exists, Joss (2015) has stated that eco-cities could be regarded as being in an experimental phase, that, eventually, can lead to a state where international norms for eco-cities have been established and accepted as best practices for building a city.

Since the concepts and the practical initiatives around sustainable urbanism are still very much in the process of development, it might be possible to guide the process towards the desired pathway through accurate governance. Urban governance can be understood as a collection of different working arrangements that involve both formal governmental and informal nongovernmental actors that together steer the development of the urban areas (Hendriks, 2014). Because many types of actors are, nowadays, steering the development of urban areas (see e.g. Frantzeskaki et al., 2017; Loorbach & Shiroyama, 2016), it should be noted that the policy instruments used in executing the governance are also diverse and include both formal and informal policy instruments.

The governance of urban sustainability transitions must deal with a high degree of complexity through the challenge of aligning the multiple sectors of the society towards sustainability (Frantzeskaki et al., 2017). Urban area's social systems consist of different kinds of routines, cultures, ideals and social groups that have the tendency to lean towards the status quo, even if the need for profound change would be apparent (Loorbach & Shiroyama, 2016). Transition processes always entail struggles within and resistance from the society (Loorbach & Shiroyama, 2016). Furthermore, the inertia of existing infrastructure makes urban transitions gradual processes (Næss & Vogel, 2012). In order to examine this complex process of an urban sustainability transition and the possibilities to govern it, the theory of socio-technical transition and the multi-level perspective (MLP) is used in this thesis. The MLP framework makes it feasible to examine how a dominant socio-technical system becomes destabilized and overcomes its path dependency (Eames et al., 2013).

There has been a growing amount of research on urban sustainability transitions but still relatively few examples what this means in practice. The aim of this thesis is to examine a possible urban sustainability transition taking place in urban planning of the city of Helsinki through the case example of Eko-Viikki neighbourhood. Eko-Viikki neighbourhood in Helsinki is the first neighbourhood in Finland designed according to sustainability criteria and has served as an internationally acknowledged experimentation ground for sustainable urban planning and construction (Helsingin kaupunki & Ympäristöministeriö, 2004). Several follow-up reports exist, but they have been compiled shortly after the construction of the area had been finished.

Now, more than 14 years after the construction of the area, it is worth to examine the neighbourhood and the possible effects of the solutions on the sustainability of the urban planning of Helsinki. The focus of this thesis is, particularly, on the role of governance and different types of policy instruments, used in the dominant system, that enable and generate urban sustainability transitions. Firstly, the policy instruments used in the Eko-Viikki process are examined. Secondly, the changes of these policy instruments to the present day are identified. Finally, a description of the general urban sustainability change is formed in order to place the Eko-Viikki solutions and their significance into context.

In order to examine the topic, I propose the following research questions:

1. Which types of policy instruments have been used in the multilevel governance of the Eko-Viikki neighbourhood?
2. How have these policy instruments changed after the end of the Eko-Viikki planning and construction process?
3. How has the context for urban planning of Helsinki changed from the start of the Eko-Viikki planning in 1994 to the present day 2018?

As for the structure of the thesis, the section 2 reviews previous literature on urban sustainability transitions, focusing particularly on the role of governance and policy instruments in it. Furthermore, it depicts the multi-level perspective that is used as an analytical framework in this research. Section 3 introduces the materials and methods used in the research. The results of the research are presented in the section 4 followed by the discussion of the results in the section 5. Finally, the conclusions of the research are drawn in the section 6.

2 URBAN SUSTAINABILITY TRANSITIONS AND MULTI-LEVEL GOVERNANCE

What do urban sustainability transitions mean, then? This chapter introduces the theoretical basis and relevant literature concerning urban sustainability transitions in the outline of this thesis work. First, a general overview on transition research and its application to urban areas is provided in section 2.1. while section 2.2. introduces the relevant literature on the role of urban governance and policy instruments in sustainability transitions. Following, the section 2.3. explains the framework of this thesis, the multi-level perspective on transitions, used in analysing the complexity of urban sustainability transitions in organised manner. Lastly, section 2.4. introduces a few of the criticizing arguments towards the MLP-framework that are addressed in this thesis.

2.1 Transition studies –focus on urban areas

Transitions have been defined as profound and structural system changes where a society or its sub-system changes remarkably (Rotmans et al., 2001; Loorbach & Shiroyama, 2016). They are regarded as multi-dimensional and dynamic processes where changes take place in multiple different domains that are intertwined with each other (Rotmans et al, 2001). Therefore, transitions are results of a co-evolution of ecological, technological, economic, cultural, behavioural and institutional domains at different levels (Loorbach & Shiroyama, 2016). Several domains must experience changes in order for transition to emerge (Rotmans et al., 2001).

Similarly, transitions have also been defined as temporally slow and gradual processes that take at least one generation to form (Rotmans et al., 2001; Loorbach & Shiroyama, 2016). Furthermore, Rotmans et al. (2001) have described the process of transitions as a patchwork of fast and slow dynamics that evolve at different paces. In Rotmans' theorization, the properties that change in relatively slow pace are called stocks. For example, cultures and lifestyles are described as stocks. Flows, on the other hand, are aspects that change relatively quickly. These can be either material and informational flows, or economic changes. In between these opposites, there are also changes, such as technological and institutional ones. The whole system change is eventually constrained by the slowest processes, meaning the development of stock properties. Because transitions consist of different dynamic layers developing at different paces, profound changes do not, always, occur in all of the properties of the system at the same time. This results in that there are several possible development paths towards the transition.

Research on transitions and other system changes has developed under different terms that, also, define transitions slightly differently (Geels & Schot, 2007). One of the main lines of transition research is the sociotechnical approach and multi-level perspective (MLP) that has mostly come to be known by the works of scholars Frank Geels and Johan Schot (Næss & Vogel, 2012). The socio-technical approach describes transitions as changes from one dominant socio-technical system to another (Geels, 2004). Socio-technical systems consist not only of material artefacts and technology, but also of a network of actors and institutions, such as cultural meanings and norms, that hold the system together (Geels, 2004). More abstractly, socio-technical systems have been defined by Geels (2004) as “linkages between elements necessary to fulfil societal functions”, such as transport and communication.

As the transition theories are usually generic concepts, they are applicable to various contexts and situations (Loorbach & Shiroyama, 2016). Over the last decade, transitions studies have increasingly started to develop theories and tools on how to analyse urban sustainability transitions (Loorbach & Shiroyama, 2016) and how they can be governed (Hodson et al., 2017). This dialogue has been stemming considerably from socio-technical transition approaches, especially from the multi-level perspective, combined with geographical insights (Hodson et al., 2017).

Urban sustainability transitions differ in many ways from the sector-specific transition approach that has, previously, been the main focus in the sustainability transition literature (Frantzeskaki et al., 2017). Earlier transition research has studied transitions dynamics in one specific domain, such as energy or water sector (Frantzeskaki et al., 2017). Sustainability transitions in the urban systems, on the other hand, are multi-sector transitions, which require all the different sectors and dimensions of urban society to become realigned; technologies and infrastructure, governance and institutional frameworks, cultural environment and residents’ lifestyles (Frantzeskaki et al., 2017).

The nature of cities further complicates the sustainability transitions in them. Cities are complex socio-spatial structures that have significant diversity within (Næss & Vogel, 2012). Significant variation is present in social features, such as population size and affluence level, as well as in the geographical features, like climate (Næss & Vogel, 2012). Cities also consist of multitude of different types of neighbourhoods, building types and transport infrastructure (Næss & Vogel, 2012). Realigining all this diversity is nonlinear and complex change process (Frantzeskaki et al., 2017).

Furthermore, city infrastructure involves the contradiction of being both unstable and stable at the same time. The built environment and the transport infrastructure are constantly changing, and, therefore, small alterations are happening (Næss & Vogel, 2012.) New neighbourhoods are built, individual old buildings are demolished, buildings are renovated, new traffic routes are built, and old ones are repaired. Consequently, it should be noted that transitions are often gradual in the urban structure (Næss & Vogel, 2012). On the other hand, urban transitions also face challenges in the inertia of existing building stock (Hodson & Marvin, 2009; Næss & Vogel, 2012). The existing buildings and other infrastructure create path dependency through their sunk investments (Næss & Vogel, 2012). Significant investments, and therefore also risks, must be made in order to realise solutions in the urban sphere (Ernst et al, 2016). New technological innovations exist alongside the old dominant ones for a long time before they actually become dominating (Næss & Vogel, 2012). Therefore, the existing building stock and transportation infrastructure are inherently very stable (Hodson & Marvin, 2009; Næss & Vogel, 2012). New innovations have the potential to change the urban structure only marginally in the short term (Næss & Vogel, 2012).

Ultimately, urban sustainability transitions are also a multi-actor process (Frantzeskaki et al., 2017). Sustainable urban planning processes concern multiple stakeholder groups from construction developers, nongovernmental organizations to residents, and a variety of different epistemic communities, such as planners, engineers and policy analysts (Joss, 2011). Therefore, various different agents, outside and within the city governments, redefine, reshape and re-enact the urban environment constantly (Loorbach & Shiroyama, 2016). Given these circumstances, the priorities of urban sustainability are negotiated into decisions in complex governance structures (Joss, 2011). Government policy has the opportunity to influence the direction, speed and scale of the transitions to a certain extent but not entirely control them (Rotmans et al., 2001).

2.2 Role of multi-level governance and policy instruments

Nowadays, urban transitions are steered in a society where governance has become increasingly polycentric and decision-making power has been distributed to multiple different levels and scales (Hodson & Marvin, 2010). Governance has been defined in many ways but in this thesis the definition of urban governance by Hendriks (2014) is chosen; “---the concept of—urban—governance refers to the more or less institutionalized working arrangements that shape productive and corrective capacities in dealing with—urban—steering issues involving multiple governmental and nongovernmental actors”.

Urban governance involves a variety of different actors both from formal and informal arrangements, local government being just one part of this network. In urban governance the formal decision-making bodies still have a significant role, but it should be noted that city government is not the only official steering body in the city. Also, city councils, mayors and other official governing bodies have their role in steering of the urban sphere. Therefore, urban governance is built from many fragmented “offices” that have their own, and often clashing, interests in the urban areas. Actors operating in the urban sphere and its governance include not only civil service departments but also more informal actors, such as housing corporations, resident’s organizations, local councils and individual citizens. (Hendriks, 2014.)

Moreover, urban governance that aims to advance sustainability issues has specific features and challenges. It must cope with the friction between the economic and ecological sustainability targets of cities. Firstly, in analysing the urban governance systems, it is helpful to recognize who has the power to control and change the cities, their infrastructural and societal systems (see e.g. Hodson & Marvin, 2009; Næss & Vogel 2012). Do official governing bodies in cities have the control over their city structure’s and functions’ development or is it nowadays more controlled by private, liberalized systems (Hodson& Marvin, 2009)? Næss & Vogel (2012) claim that this friction between city administration and private market interests is apparent in present day cities.

Secondly, it has been claimed that the dominant governance of cities’ focuses on short-term economic growth, placing sustainability as a secondary policy concern. The current development policies on urban sustainability seem to have increased technological and economic improvements in the cities, but at the same time, the global consumption has increased as well. Accordingly, the focus on the technological and economic development has been unable to produce truly transformative sustainability strategies. (Loorbach & Shiroyama, 2016.)

Apart from examining the network of actors inside the city governance, it should be noted that urban sustainability transitions require multi-level examination that goes also beyond the city’s borders. Eco-city projects are embedded in different geographical and governance levels (Joss, 2015), from neighbourhood, city, and nation levels all the way up to international levels. The distinct complexity of the field demands good understanding of the multilevel governance processes they are embedded in (Joss, 2015). Loorbach and Shiroyama (2016) state that as cities influence the majority of global sustainability issues, it is clear that no single governance structure or level can solve the issues on

their own. Urban sustainability solutions are needed both from the bottom-up innovations as well as from the higher level, top-down policies (Loorbach & Shiroyama, 2016).

All in all, the governance of urban sustainability transitions is said to require new tools for steering the process (Loorbach & Shiroyama, 2016). These tools, policy instruments, are used in executing the governance. As this thesis examines the different types of policy instruments that have been used in urban sustainability governance process, a clarification of the policy instrument classification used is needed. Policy instruments can be categorized in different ways. In this thesis the common classification of environmental policy instruments (e.g. Vedung, 1998; Barde, 1994) is chosen, because it specifically considers instruments related to environmental policies. The classification of environmental policy instruments categorizes instruments into regulations, economic instruments and informational instruments (e.g. Vedung, 1998; Barde, 1994).

Regulations are policy instruments that aim to guide behaviour by adjusting the options open to actors (Mickwitz, 2003). Regulations include instruments such as zoning, standards, permits, bans and use restrictions (Mickwitz, 2003). They have also been named as “command and control”-instruments (Barde, 1994). Economic instruments, on the other hand, focus on altering the costs and benefits of certain actions to the actors (Mickwitz, 2003). Economic instruments include for example taxes and charges, permit markets (e.g. emission trade markets), grants as well as subsidies (Barde, 1994). Lastly, informational instruments aim to change actors’ attitudes towards environmental issues; how significant matters the issues are rated and whether they are set as a priority (Mickwitz, 2003). Information can be knowledge about the policy instruments used or a policy instrument on its own (Vedung, 1998). Informational instruments include for example all kinds of campaigns and trainings that disseminate information as well as different certification and environmental management systems (Mickwitz, 2003).

The chosen classification is based on the degree of authoritative force involved in the action (Mickwitz, 2003). Vedung (1998) states that another constituent part of the policy instruments is the actual substantive action content. The substantive action content can be divided into a variety of different sub-categories. These categories can be, for example, land-use policy instruments, social policy instruments, cultural policy instruments and environmental policy instruments, just to name a few. In this thesis, the most relevant and examined instruments concern land-use, construction and environmental policies.

Furthermore, some general suggestions have been made for the types of policy instruments to be adopted in urban sustainability governance. The policy instruments used in urban sustainability transitions should, indeed, take into consideration the complexities and uncertainties, long time horizon as well as the wide range of people and interests involved in the process (Loorbach & Shiroyama, 2016). It is vital to address the temporal scale of policymaking since the transition of these global challenges extends over the normal policy cycles and requires long-term investments (Loorbach & Shiroyama, 2016). To address the above-mentioned issue of private market interest, urban sustainability transition processes are said to need support also from the higher-level actions, such as national-scale regulations and wider political-economic structures and mechanisms that drive sustainable lifestyles (Næss & Vogel, 2012). New innovations need to be implemented consistently over a long period of time through strong governance and supporting policies so that they become dominating in the urban structure (Næss & Vogel, 2012).

2.3 Multi-level perspective framework

In order to structure the complexity of governance and the use of policy instruments enabling an urban sustainability transition, a framework for the analysis is needed. A multilevel approach is essential to see the connections between macro, meso and micro levels (Loorbach & Shiroyama, 2016). The multi-level perspective (MLP) on socio-technical transitions (see e.g. Geels, 2002) is, therefore, chosen in this thesis. It is a useful framework to examine the dynamics between different levels of the transition (Loorbach & Shiroyama, 2016). Moreover, it allows the depiction of how the socio-technical regimes or dominant systems might become destabilized and overcome their lock-ins and path dependency (Eames et al., 2013). MLP has also been seen as a useful framework in compiling descriptive narratives of transition processes (Næss & Vogel, 2012). Accordingly, the focus in this thesis is to produce a description of the possible transition towards sustainability in the Helsinki urban planning, using Eko-Viikki as a niche case example.

MLP describes transitions as outcomes of interaction processes occurring in and between three analytical levels; landscape, regime and niche (see e.g. Geels, 2002; Geels & Schot, 2007, Hodson & Marvin, 2010). Socio-technical landscape forms the exogenous environment that cannot be directly influenced by niche and regime actors (Geels & Schot, 2007). Landscape is composed of slowly changing characteristics, such as macro-level policies, macro-economics and deep cultural patterns, including, for instance, worldviews and belief systems (Geels & Schot, 2007; Rotmans et al., 2001). Niches on the other hand, act as locations for learning processes that create novel solutions differing

from the existing rules of the regime (Geels, 2004). The learning can be targeted for example towards public policies, technology or user preferences (Geels, 2004). Novel system innovations born in niches can eventually be scaled up and used by the regime and, ultimately, even replace it (Geels, 2004). According to MLP the pressure should come from both the sociotechnical landscape changes on the dominant regime and from the niche-innovations building up internal momentum in order for a transition to occur (Geels & Schot, 2007). Regime starts to destabilise, and windows of opportunity open up for the niche-innovations to compete with the existing regime (Geels & Schot, 2007). This ultimately enables the change of the dominant regime towards a new regime (Geels & Schot, 2007). In MLP, transitions are defined as changes from one dominant sociotechnical regime, in other words from dominant structure, to another (Geels & Schot, 2007).

Increasing structuration
of activities in local practices

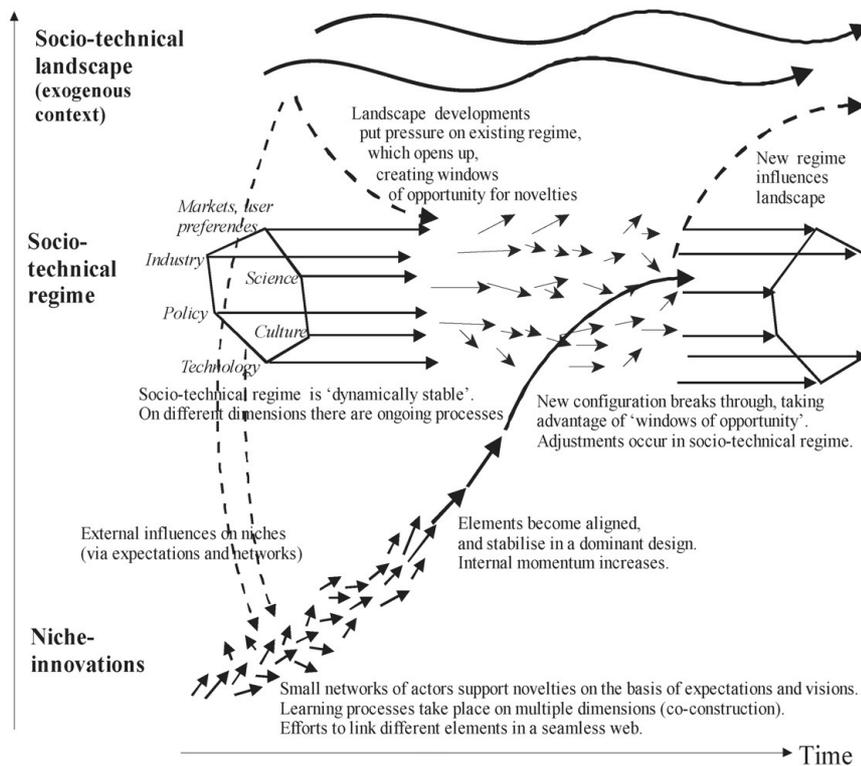


FIGURE 1. Multi-level perspective on transitions (Geels & Schot, 2007)

As the regime level is on the target of the transition (Geels, 2011), a clarification of the meaning and structure of the regime should be made. Regime is a compilation of dominant structures, practices and culture in a specific societal system (Loorbach & Shiroyama, 2016). Geels (2004) describes regimes as the “deep-structure” or the grammar of socio-technical systems that is held and reproduced by the social groups composing the regimes. Regimes can also be described as “semi-

coherent sets of rules, which are linked together” (Geels, 2004). The connection between the rules allows efficient coordination of activities inside the regime and, therefore, provides the stability for it (Geels, 2004). On the other hand, this alignment between the rules and stability of the regime makes it difficult to generate a transition (Geels, 2004). Changing a rule requires alteration of other rules as well (Geels, 2004).

Furthermore, regimes are composed of different dimensions of policy, markets, science, technology and culture that are, in turn, coordinated by multiple sub-regimes including their own dynamics (Geels, 2011). However, the dimensions are also dependent on each other and therefore evolve together (Geels, 2011). Moreover, regimes are considered socio-technical because the development of technology co-evolves along with the social interests and functions (Geels & Schot, 2007). Multiple different actors shape the development of the technology from engineers to policymakers and businesses all the way to the NGO’s and consumers (Geels & Schot, 2007). The dominant regulations, consumption patterns, policy priorities and investment resolutions are intertwined with each other through the interests and decision-making of the regime actors (Geels & Schot, 2007). These decisions not only hold together the socio-technical regimes and provide stability for them, but also results in the tendency to follow the dominant trajectories (Geels & Schot, 2007).

2.4 Examining criticism of multi-level perspective

MLP-concept has been criticized for several reasons (see e.g. Geels, 2011). In this thesis, the focus is on two critiques that are the most intriguing when examining transitions taking place in cities; the concept of regime in transitions and its spatial applications. Transition approaches have not had much focus on the spatial scales where transitions take place (Hodson & Marvin, 2010). Case studies using the MLP framework have often had national level focus as a taken for granted spatial context (Hodson et al., 2017). Therefore, the sub-national scales (e.g. regions, cities) and their role in transitions have not been clear (Hodson & Marvin, 2010). However, MLP does not prescribe the boundaries of the empirical topic of the analysis (Geels, 2011). The analytical concept of regime can empirically be applied to different scopes as long as the analyst clearly states the decisions made while defining the boundaries of the object of the study (Geels, 2011). The clarification should be made in order to accurately evaluate the significance of the changes observed. What could be stated as a transition at one level of definition (e.g. neighbourhood), could be marked as an only a slight change in wider regime level (e.g. city) (Geels, 2011).

Furthermore, the MLP has, conventionally, focused in describing transitions where a singular niche innovation struggles to break through into the incumbent regime (Hodson et al., 2017). Geels & Schot (e.g. 2007) have mostly used historical examples of one type of artefact changing to another. This niche-driven typology of transitions depicts the process as technological substitution, where the new technologies emerge from niches to the mainstream markets and replace the existing, dominant systems (Geels and Schot, 2007). In niche-driven typology, incumbent regime actors are depicted as embracing the rule-following activities that reproduce and stabilise the existing regime (Quitza et al., 2013).

This niche-driven typology is argued to downgrade the agency of regime actors in transitions (see e.g. Quitza et al., 2013), and re-conceptualization of the regimes is said to be needed (Quitza et al., 2013; Smith et al. 2004). Smith et al. (2004) see that regime endogenous transition perspectives should be acknowledged and further developed. Regimes and regime actors have the possibility to take also a reactive approach by improving the dominant system through opening it to new innovations or even actively supporting innovations (Rotmans et al., 2001). Therefore, transition process can be also conceptualized as a result of incumbent regime actors making conscious and planned efforts in responding to perceived pressures and using regime-internal resources (Smith et al, 2004). Rotmans et al. (2001) have claimed that also internal conflict can be a source of change of the regime, not only external pressure. Therefore, MLP dynamics can take place in interactions both between and inside different levels (Loorbach & Shiroyama, 2016). These responses and confrontations within the regime represent, what Geels (2006) terms as ‘gradual regime adjustments’, where new technologies follow, rather than drive, regime developments in contrast to the technological substitution path (Quitza et al., 2013).

The need to develop more agency-oriented transition perspectives is particularly important in urban sustainability transitions since there are indications that urban governments, as regime incumbent actors, do make conscious and planned efforts to change the regime (see e.g. Hodson and Marvin, 2010; Quitza et al., 2013). Urban governments are actively trying to change their regime through ambitious sustainability action plans (Hodson & Marvin, 2010). Quitza et al., (2013) state that urban governments do have endogenous agency in regime enactment and urban scale regimes can be strategically fruitful rather than paralyzing. A key challenge is to abandon the tendency to conceptualize cities as being merely sites for receiving transition initiatives (Hodson & Marvin, 2010).

By acknowledging that the regime internal dynamics have relevance in transitions, scholars have increasingly started to do research on alternative perspectives of the role of the regime in transitions (see e.g. Rotmans et al., 2001; Quitzau et al., 2013). Quitzau et al. (2013) for example found through their case study that transformations commencing in the regime differ from the niche-innovation initiatives concretely. The regime incumbent actors need to engage in direct confrontations with other regime actors to be able to change the structures of the regime and make way for new technologies. In niche-driven perspective the niche actors are more focused on developing new technologies in “the protective space” that contain only selected actors.

Altogether, this thesis focuses especially in examining the role of the regime in urban sustainability transitions. Can the regime have endogenous agency in enabling the urban sustainability transitions? What is the role of urban governance and policy instruments used in the regime in driving forward the transition? These questions are returned to in the discussion section.

3 MATERIALS AND METHODS

This chapter consists of three parts. First, the case under study in this thesis is introduced. The second part focuses on the process of gathering the materials of this study and analysing the data. Discussion about the choices of the materials and analysis is also presented here. Finally, the credibility of the research is contemplated.

3.1 Case study: Eko-Viikki neighbourhood and urban planning of Helsinki

Case study has multiple features that makes it appropriate for the topic of this thesis. It is said that case study research is particularly suitable for a research where the focus is to understand complex social phenomena (Yin, 2014). This is the case in this thesis, which concentrates on urban sustainability transitions taking place in multi-level governance. One of the benefits of case study research is that it makes possible to examine a bounded contemporary phenomenon in depth and yet keep a holistic and real-world perspective (Yin, 2014). All research aiming to investigate, describe and explain operational links over time, through questions like how and why, are especially well suited for case study (Yin, 2014). In this thesis, the aim is, indeed, to describe how urban sustainability transition has possibly been taking place over time. Furthermore, case study research method has also been applied to study neighbourhood change before (Yin, 2014).

The case study in this thesis examines urban sustainability transition through Eko-Viikki neighbourhood and, more widely, urban planning of Helsinki.¹ Eko-Viikki neighbourhood in Helsinki is the first neighbourhood in Finland that has been designed according to sustainability criteria (Helsingin kaupunki & Ympäristöministeriö, 2004). Eko-Viikki was planned and built to the geographic centre of the city, eight kilometres from the city centre between the years of 1994 and 2004 (Helsingin kaupunki & Ympäristöministeriö, 2004). In 2016 there were altogether 1788 residents living in the Eko-Viikki area (SeutuCD, 2018).

Before the construction, the area consisted mainly of culturally valuable field landscapes that were surrounded by the Viikki-Vanhankaupunginlahti nature reservation area in the south (Helsingin kaupunki & Ympäristöministeriö, 2004). Eko-Viikki is a southern part of larger Viikki

¹ This thesis was done as a part of a research project “Miten kestävyysmuutos toteutuu kaupungissa -esimerkkinä Eko-Viikin asuinalue Helsingissä” (Kemut), but all the materials for this thesis were collected by the writer.

neighbourhood (Kaupunginsuunnitteluvirasto, 2004). One of the campuses of the University of Helsinki is located on the western edge of the area (Helsingin kaupunki & Ympäristöministeriö, 2004).

The objective for the development of this neighbourhood was to experiment with new sustainable planning and building solutions that would reduce the carbon footprint of the area construction as well as the amount of resources used and, ultimately, waste produced in the process (Kaupunginsuunnitteluvirasto, 2004). At the same time, a healthy and pleasant living environment was aimed to be enhanced by solutions such as community buildings and green areas with gardening plots (Helsingin kaupunki & Ympäristöministeriö, 2004). One of the distinctive features in the detailed plan was also the use of “green fingers”, in other words green areas, as a storm water management solution (Helsingin kaupunki & Ympäristöministeriö, 2004). Other technical solutions included for example solar panel systems, gravitational ventilation and placing windows towards south in order to get a maximum benefit from the sunlight (Kaupunginsuunnitteluvirasto, 2004).

Eko-Viikki neighbourhood is referred in the follow-up documents (see e.g. Kaupunginsuunnitteluvirasto, 2004; Helsingin kaupunki, 2004) often as an ecological neighbourhood. This describes well the changing use of terms in describing the sustainability of the urban environment. In the mid-1990's the term ecological was used almost as a synonym for sustainable development and the urban planning focused, in many cases, more on the ecological sustainability, as also in the case area of this study, Eko-Viikki (Helsingin kaupunki & Ympäristöministeriö, 2004). Later on, other parts of sustainable development, social and economic sustainability, have increasingly been included into the research and development activities (Helsingin kaupunki & Ympäristöministeriö, 2004). In this thesis, the terms sustainability and ecological sustainability are used instead of ecological for describing the urban planning actions, because they are more precise terms to depict the area and its focus of development.

The wider case in this thesis is the urban planning of Helsinki. Urban planning has been defined in different ways throughout history and even nowadays the term has slightly different emphasises depending on research traditions (Tieteen termipankki, 2018). Here the urban planning is defined to be consisting of the land use planning and construction that are taking place in the urban areas (Tieteen termipankki, 2018).

One of the central ways to steer land use and construction activities in the city is zoning (Tieteen termipankki, 2018). In Finland, the zoning is based on three stage planning system that consists of regional plans, master plans and detailed plans, on the regional and municipal levels (Jaakkola, 2012). The system is hierarchical; regional plan guides the making of master plans and master plans guide the compiling of the detailed plans (Jalkanen et al., 2017). A regional plan tries to ensure a good regional structure by providing favourable conditions for business and industry, while at the same time fostering preservation of ecological sustainability (Jaakkola, 2012). In the municipality level, master plan is used as a strategic and visionary tool to guide land use and community structure (Jaakkola, 2012). It defines the principles for the desired development paths and indicates areas for specific uses for the detailed planning. (Jalkanen et al., 2017). The detailed plan regulates land use and construction more specifically, designating for example locations for different functions and the size and type of the buildings (Jaakkola, 2012). The detailed plan is the only plan which is legally binding (Jaakkola, 2012). The plans are approved by the municipal or city council (Jaakkola, 2012). Between the general plan and detailed plan, there is also an option for making a component master plan², that is used usually for a smaller area inside the municipality (Jalkanen et al., 2017)

In addition to the official planning system levels, the national land use guidelines steer the national level issues, such as transport- and energy-network solutions, which have significant effect on ecological sustainability and on the economy of area structure (Jalkanen et al., 2017). The state and city officials need, evidently to follow and advance the national land use guidelines in their work (Jalkanen et al., 2017).

The case study is examined through the framework of multi-level perspective (Geels & Schot, 2007). As the framework is an analytical concept, it does not define the scope of the empirical topic but in the operationalization of MLP the analytical levels should be made clear because it has implications on the analysis and its results (Geels, 2011). In this research, niche level is outlined to examine the Eko-Viikki neighbourhood while regime is defined to be the urban planning of Helsinki, consisting of land use and construction activities. Landscape level includes the national level and, for the relevant parts, the international level of EU governance that is affecting the urban planning of Helsinki.

² Osayleiskaava in Finnish

3.2 Research approach

The research approach and process are summarized below and explained more in detail in the following sections.

	Aim	Collection	Analysis	Results
Phase 1	Case context gathering	Document search	Initial readings	<ul style="list-style-type: none"> • Overall view of the case • Assistance in gathering the relevant documents for the analysis • Targeting of the interviewees and interview questions
Phase 2	Answering 1. and 2. research question	Documents and interviews	Theory-based classification	<ul style="list-style-type: none"> • Which types of policy instruments have been used in the multilevel governance of the Eko-Viikki neighbourhood? • How have these policy instruments changed after end of the Eko-Viikki planning and building process?
Phase 3	Answering 3. research question	Interviews	Qualitative content analysis	<ul style="list-style-type: none"> • How has the context for urban planning of Helsinki changed from the start of the Eko-Viikki planning in 1994 to the present day 2018?

Table 1. Process and methodology of the research

3.3 Documents: policy instrument analysis

Materials of this study consist of two sources; policy documents and semi-structured interviews. First, the gathering, classification and analysis of the policy documents is explained. In phase one of the research, an initial document search and examination was done to gain a perspective what is already known of the Eko-Viikki planning, building and follow-up as well as the policy instruments used in guiding that process. This was a relevant first step so that this study would avoid examining what is already known as Eko-Viikki project has already been well documented during and after the planning and construction process. The document analysis started with investigating the main follow-up reports made of Eko-Viikki (Helsingin kaupunkisuunnitteluvirasto, 2004; Helsingin kaupunki & Ympäristöministeriö, 2004). This initial examination provided a clearer view for the needs of the actual policy document search and analysis. Also, the selection of interviewees and the basis for framing interview questions were done in this phase.

In phase two, after this initial document analysis, relevant policy documents were identified and selected for deeper analysis in order to find answers to the first two research question; “Which types of policy instruments have been used inside of the multilevel governance of the Eko-Viikki neighbourhood?” and “How have these policy instruments changed after the end of the Eko-Viikki planning and building process?”. The first research question was selected to examine the time period between the years of 1994 and 2004, but, for the relevant parts, also some policy instruments used before the year 1994 are included to the results. The second research question is examining the years between 2005 and 2018. Besides further investigating the main follow-up reports, the document analysis was extended to include the following documents: Land-Use and Building Act and documents concerning City of Helsinki’s strategies, master plans and environmental assessments.

After the materials were gathered, the policy instruments found from the documents were classified in line with two principles. Firstly, instruments were classified based on the level of the MLP framework, whether the instruments were applied on landscape, regime or niche level. Secondly, they were grouped, according to the environmental policy instrument classification (Vedung, 1998; Barde, 1994) into regulations, economic instruments and information. Additional group, “other instruments”, was added since all the instruments did not fit the three theory-based categories. New policy instruments that were used for the first time were underlined in the table.

To identify the significance and ambitiousness of the policy measures used in Eko-Viikki, the changes of the policy instruments were searched through the documents and interviews. This gave an insight whether Eko-Viikki policy instruments are applicable in governance of future neighbourhoods that aim for sustainability, or if the ambitions of that time are already outdated. Naturally, some of the instruments used in Eko-Viikki were one-time instruments, such as specific funding arrangements and the change of these instruments is relatively hard to depict. Therefore, they were left out of the examination of the changes in policy instruments. This study trusted that interviewees would have mentioned if there had been significant and stable new policy instruments, that would have corresponded with the ones used in Eko-Viikki, for example related to funding mechanisms.

3.4 Interviews: context of the urban planning changes

Besides the secondary material of policy documents, primary research material was also gathered with interviews in the phase 3. The interviews were carried out through semi-structured expert interviews. Expert interviews are important source of knowledge if the processes being examined are still ongoing (Alastalo & Åkerman, 2010), as in this case study. Preparing oneself to expert interviews requires the researcher to familiarise oneself to documents or prior interviews (Alastalo & Åkerman, 2010), as was done in this research through the initial document analysis.

Expert interviews can be used to construct “a thicker analysis” (Alastalo & Åkerman, 2010), meaning that interviews can provide explanations for some of the shortcomings in the documents and documents might, correspondingly, support some unclear statements in the interviews. This triangulation of data heightens the validity of the study (Tuomi & Sarajärvi, 2009). In order to gain facts, it is important to read and analyse the different resources crosswise (Alastalo & Åkerman, 2010).

The interviews were targeted to answer the third research question “How has the context for the urban planning of Helsinki changed from the start of the Eko-Viikki planning in 1994 to the present day 2018?”. In addition, the interview material was used to validate the document analysis of the first two research questions. The material was used as a complementary part of the document analysis to include more details about the use of policy instruments, especially the ones used later on in the urban planning regime. Experts provided verification that the most relevant instruments were taken into the analysis and provided maybe even a better view, compared to the documents, on which of the new Eko-Viikki policy instruments inside the urban planning had been used afterwards. Furthermore, the

landscape level data, gained from the interviews, was used as verifying and explaining material throughout the analysis to observe which of the proceedings have contributed to bigger transitions into urban planning sustainability.

As stated above, the topic of urban sustainability transition involves many actors, stakeholders and experts from multiple levels and sectors of society. Due to limited resources of a master's thesis, quite a strict selection needed to be made in the selection of the six interviewees. Quite often the experts in specific case study are also limited (Alastalo & Åkerman, 2010). The experts are selected and interviewed because of the knowledge that they are considered to possess, that often derives from their institutional position (Alastalo & Åkerman, 2010). In this thesis, relevant interviewees were selected based on their positions in the process of planning, building and follow-up of the Eko-Viikki neighbourhood and more widely of the urban planning of Helsinki. Furthermore, they were selected to represent evenly the different levels of the multi-level perspective. Five of the interviewees were identified through earlier Eko-Viikki follow-up document (Helsingin kaupunki & Ympäristöministeriö, 2004) and one separately to represent the specific knowledge of current urban planning procedures. Selection of the interviewees is explained in the table below.

	Organisation	Expertise	Code
LANDSCAPE	The Finnish Association of Architects (SAFA)	Stakeholder in the Eko-Viikki process and knowledge on architecture	H1
	The Ministry of the Environment	Stakeholder in the Eko-Viikki process and knowledge on legislation	H2
REGIME	The Urban Planning Department ³ of the City of Helsinki	Stakeholder in the Eko-Viikki process and concrete urban planning knowledge during Eko-Viikki planning and construction	H3
	The Urban Environment Division of City of Helsinki	General knowledge on the state of Helsinki urban planning today	H4
NICHE	The City Office of Helsinki	Wide knowledge on the Eko-Viikki process as a coordinator of Eko-Viikki project	H5
	The working group creating PIMWAG-criteria	Creator of new policy instrument in Eko-Viikki	H6

Table 2. Selection of the interviewees

³ Nowadays part of Urban Environment Division of City of Helsinki

More actors were identified as relevant stakeholders of the Eko-Viikki planning and building process but considered not to have the exact expertise or the knowledge of the issues examined in this thesis. Accordingly, the following actors were excluded from the interviews; construction developers, building contractors, house managers, housing architects, designers and residents.

Interviews were all individually structured to target the special expert knowledge that interviewees hold via their professional status, as is typically done in the expert interviews (Alastalo & Åkerman, 2010). Still, most of them held some common themes since the interview questions were addressed to answer the specific research questions. These common themes were policy instruments used during and after Eko-Viikki process as well as the changes in the urban planning of Helsinki. All the interview question forms can be found in appendix 1.

Five of the interviews were done face to face and one via Skype call. The length of the interviews varied from 40 minutes to 55 minutes. On the average they were about 48 minutes long. One interview was conducted in January 2018, the rest in May-June 2018. The interviews were conducted in Finnish. Therefore, interview questions and quotes were translated from Finnish to English for this thesis. The interviewees are referred in the text as representatives of their organization and their identities are not revealed. The codes from the Table 2 are used throughout the text to specify citations from certain actors.

All the interviews were transcribed *ad verbatim* i.e. word by word excluding additional sounds such as sighs, hesitations, pauses, stresses and laughs for their irrelevance for the analysis focusing on the subject matter. Highly exact transcription with all the sighs and other sounds is not needed in research where the focus is mostly in the contents of the interviews and not in the underlying meanings of the talk (Alastalo & Åkerman, 2010).

3.5 Qualitative content analysis

From the point of view of this research the most relevant analysis method to use was the qualitative content analysis because it made it possible to examine and understand the role of governance and different types of policy instruments in generating the urban sustainability transition. Qualitative content analysis is one of the basic analysis methods used in the qualitative research tradition (Tuomi & Sarajärvi, 2018). Qualitative content analysis process starts with dividing the analysed text into smaller parts which, in turn, continues to re-conceptualisation of the text while, in the end, the text is

organised to a new entity (Tuomi & Sarajärvi, 2018). Though, the qualitative research process is usually not that straight-forward and simple. In qualitative research in general, and in research where the aim is in process description, the collection for the data and analysis are not separate entities (Alastalo & Åkerman, 2010). Rather it is a process of going back and forth with the gathering of the materials and the analysis. This feature was also visible in my research process, where the data analysis revealed additional needs of knowledge that lead to further data collection and analysis.

As the interview material was not extensive, the analysis of the material was done manually by searching common themes that explained the context for the urban sustainability transition and verified the policy instrument analysis. The data was first divided under the levels of landscape, regime and niche. The regime data was used to answer the third research question and to explain on how the context for the urban planning of Helsinki has changed throughout the years. Under the regime the data was further classified under the different spheres of the regime; policy, markets, science, culture and technology in order to analyse regime internal dynamics.

Furthermore, theory-bound research, where the theories are in the background of the analysis, but is not strictly bound to it (Eskola, 2018), is used here. The formation of the research questions and the analysis was based on the two theories of multi-level perspective on transitions and the policy instrument analysis framework, but room was left for other interpretations from the materials. In theory-bound research the findings of the research data are compared to the used theories to search explanations and to verify the findings (Eskola, 2001). On the other hand, the findings can also be controversial to the theory and then new theories and explanations are created (Eskola, 2001).

3.6 Credibility of the research

Credibility of the research methods is usually depicted through the concepts of validity and reliability (Tuomi & Sarajärvi, 2018). Reliability means that the same research results can be achieved by replicating the research methods (Tuomi & Sarajärvi, 2018). Reliability of this study was enhanced through detailed description of the research methods in order for them to be replicable, if needed. As to validity, it denotes that the research is examining things that are promised (Tuomi & Sarajärvi, 2018). Data triangulation, in other words using multiple sources of evidence, was chosen here as a relevant method as it has been said to increase the validity of a case study research (Yin, 2004). Therefore, data was chosen to be gathered from both documents and interviews to verify the findings of a complex phenomenon. Converging lines of inquiry from multiple sources of evidence, which corroborate the same finding increase the likelihood that the case study has managed to capture the

event or phenomenon in hand as accurately as in real-life (Yin, 2004). It should be noted that data triangulation does not mean only having multiple sources of evidence. If the sources are analysed separately and they address different findings of the research it cannot be called triangulation (Yin, 2004). In proper triangulation, all or couple of the different evidences contribute to and support to the same findings (Yin, 2004). Therefore, data gathered from the documents and the interviews were partly used to answer and verify the same research questions. The process is explained more in detail above.

Triangulation can be executed also through using multiple research methods, researchers or theories (Tuomi & Sarajärvi, 2018). Researcher triangulation was also used in this research process as the thesis was done as a part KEMUT-research project. The preliminary results were shortly discussed and commented in the research project meetings, which gave a small input and specification for the results.

As in any research, there may be methodological shortcomings in my thesis. In expert interviews the common risk is that the interviewees might give distorted answers. Interviewees might not remember how events came to be in reality if asked of events taking place years or even decades ago (Alastalo & Åkerman, 2010). This was noticeable in the interview situations of this thesis; interviewees were pondering and admitting that they do not always remember the details of asked matters. To address this deficiency, document analysis was used to check the details about the policy instruments that interviewees talked. Furthermore, the interviewees might also lie to protect their own reputation and make excuses to explain their actions in their favour (Alastalo & Åkerman, 2010). This risk was addressed by guaranteeing anonymity for the interviewees. Still, as the experts of this case study are limited, full anonymity is hard to provide, and this was admitted to the interviewees.

Furthermore, the answers given, as well as the process descriptions and interpretations produced, are always happening in specific interaction process with the interviewer (Alastalo & Åkerman, 2010). How the interviewer asks questions and comments on the answers naturally has an effect on the interviewee. Related to this, it was noticeable that urban planning was understood in the interviews in many different ways because of the breadth of the concept. Some interviewees did clarify their standpoint or asked the interviewer to clarify which part of urban planning was under discussion in the interview. The concept and its meaning in this research could have been explained in the beginning of the interviews in order to make the questions more targeted. On the other hand,

not explaining the concept allowed more freedom for the interviewees to express their own standpoint and expertise.

Saturation is a term that is used in talking about the sufficiency of the materials under study and means a situation where the materials are showing repetitive pattern (Tuomi & Sarajärvi, 2018). Based on this, it is presumable that the informants cannot produce new and relevant information for the study anymore (Tuomi & Sarajärvi, 2018). The assumption behind this is that a certain amount of material is enough to provide the basic theoretical pattern that can be derived from the topic under study (Tuomi & Sarajärvi, 2018). Some saturation could be seen in the interviewees' responses. Interviewees from different fields were talking about same issues and agreeing on certain opinions. Still, it should be noted that since the topic under study is extensive and all the interviewees represent different fields of expertise, no clear saturation could be achieved. The small number of interviewees and limited resources for the document analysis contribute also to methodological shortcomings in examining this type of wide subject. Triangulation was used to address these shortcomings as a way to deepen the analysis.

4 RESULTS

This chapter depicts the most relevant policy instruments that affected, directly or indirectly, the Eko-Viikki area becoming a more sustainable neighbourhood. First, instruments used during the planning and construction of Eko-Viikki, between the years 1994 and 2004, are described. Secondly, relevant changes in these instruments are presented, examining the years between 2005 and 2018. Thirdly, changes in the regime of Helsinki urban planning and its context throughout years are presented based on the interview materials.

4.1 Policy instruments used in the multi-level governance of Eko-Viikki

4.1.1 Landscape level of the state of Finland and European Union

4.1.1.1 Finnish land use and building legislation start to integrate principles of sustainable development

In the landscape level, during the construction of Eko-Viikki, changes were occurring in one of the most prominent regulative policy instruments concerning sustainable urban planning; the Land Use and Building Act. Already before the start of the Eko-Viikki construction, in 1990, the Land Use and Building Act was amended to include the principles of sustainable development for the first time (Helsingin kaupunki & Ympäristöministeriö, 2004). The amended first momentum states that “Area must be zoned, or its use should be otherwise planned to support the sustainable development of natural resources and environment according to how this law prescribes.” (Land Use and Building Act 1990/ 696, 1§).

Between the years 1992 and 2000, the concept of sustainable development was integrated through amendments in other parts of the Finnish legislation too, as more than 20 Acts and Decrees included statements of it (Helsingin kaupunki, 2003). The most prominent ones for the urban planning and construction being; Regional Development Act (1135/1993), Air Protection Act (17117/1995), Land Materials Act (463/1997) and the Environmental Protection Act (86/2000) (Helsingin kaupunki, 2003).

Furthermore, the Land Use and Building Act was completely renewed at the very end of 1990's which resulted in taking the principles of sustainable development into the law in a more integrated way (Ympäristöministeriö, 2014). The Act, accordingly, clearly states the general aim: "The objective of this Act is to ensure that the use of land and water areas and building activities on them create preconditions for a favourable living environment and promote ecologically, economically, socially and culturally sustainable development." (Land Use and Building Act 1999/132, 1§). The law also highlights that citizen engagement must be included in all the stages of the planning process (Jaakkola, 2012).

At first, the renewed law did not entail the climate change mitigation issues separately (Ympäristöministeriö, 2014). This was due to the fact that, when the law was under preparation in 1990's, land use planning and construction fields did not yet consider strong emission reductions as a central matter (Ympäristöministeriö, 2014). However, the law does contain significant demands for environmental protection and sustainability that also affect climate change mitigation.

The sustainability demands for the land use planning system are especially numerous. The general objectives for land use (Land Use and Building Act 1999/132, 5§) include promotion of biological diversity and other nature values, protection of environment, prevention of environmental hazards as well as economical use of natural resources. These objectives also need to be accounted for in the national land use guidelines⁴ (Land Use and Building Act 1999/132, 22§). The content requirements for province plan (Land Use and Building Act 1999/132, 28§) and master plan (Land Use and Building Act 1999/132, 39§) both state for example the need to take into consideration the ecological sustainability of land use and sustainable use of natural resources. The detailed plan content demands also state the need to protect natural environment (Land Use and Building Act 1999/132, 54§).

Furthermore, the Land Use and Building Decree states that while constructing a plan, effects to environment, to the biodiversity, natural resources and energy economy should be cleared (Land Use and Building Decree 1999/895, 1§). The Land Use and Building Decree also highlights that the environmental impact of the user phase of the building should be taken into account so that the building would be ecologically sustainable (Land Use and Building Decree 1999/895, 55§). Similarly, the decree requires that life cycle of building materials and their environmental impact should, if needed, be investigated (Land Use and Building Decree 1999/895, 55§).

⁴ Valtakunnalliset alueidenkäyttötavoitteet in Finnish

4.1.1.2 Assemblage of funding

The economic policy instruments were scarce in the Eko-Viikki project and the funding was received from different sources from the landscape level actors. The starting point for the use of economic policy instruments in Eko-Viikki was not to invent new funding tools. The Finnish Funding Agency for Technology and Innovation⁵ (Tekes from here onwards) provided the most substantial funding mechanism in the area between the years 1998 and 2000. This research and product development funding for the area aimed to encourage the construction companies and the owners of the Eko-Viikki properties to develop innovative ecologically sustainable solutions. However, the amount of funding was relatively low compared to some international examples, which hindered the most ambitious plans to be executed. From the Tekes side, the establishment of this kind of temporary support system was considered laborious and expensive to administer. Furthermore, there was also a general doubt that this kind of funding would create an unfair advantage and distort the competition in the construction markets. (Helsingin kaupunki & Ympäristöministeriö, 2004.)

Besides the Tekes funding, Eko-Viikki development team also made an effort to get additional funding through international funding projects. Through actively developing contacts to similar urban sustainability projects abroad, some additional funding was gained to certain projects, such as three different solar energy projects. Also, a Nordic joint project where the goals and criteria of Viikki, Hammarby Sjöstad in Stockholm and Örestad in Copenhagen were compared, got funded. (Helsingin kaupunki & Ympäristöministeriö, 2004.) All in all, couple of interviewees did see financing as central enabler for sustainable construction and further, that even more financial support would have been needed to implement more ambitious experimental construction projects in Eko-Viikki (H3, H5).

4.1.1.3 Clear need for information on sustainable land use and construction

In the landscape level, the general rise of sustainability thinking during the years of Eko-Viikki planning and building, was stated in unison by all of the interviewees. The Brundtland Commission and their concept of the sustainable development was seen as an important thought leader that also awakened the land use planning and construction fields to consider sustainability issues properly in their work for the first time. Some individual examples of sustainable building could be found already before Eko-Viikki, but they were in the level of individual building experiments, not such area level sustainability projects as Eko-Viikki.

⁵ Nowadays part of Business Finland

“--Well, at that time (during the Eko-Viikki project) there were actually not that much tools regarding it (sustainability). It wasn't particularly dealt with in zoning. In the building law there were some requirements for sustainable development, but we were so much in the starting phase, that everyone had relatively little information, and actually no tools either at that point. Maybe the meaning of Viikki was in that it advanced the information and widened the circle that was excited about it. --”
(H4)

There was a clear need for more information and concrete tools for sustainable urban planning. The Eko-Viikki follow-up report (Helsingin kaupunki & Ympäristöministeriö, 2004) confirms that there was a need to sharpen the vision of sustainable development in land use planning and construction. Hence, multiple research programs were initiated on the topic. This research included both academic research and research on practical applications. A research project on sustainable construction⁶ initiated by Academy of Finland⁷ in 1995 provided an academic foundation on the topic. The program consisted of 21 projects that performed a wide research on the theoretical basis of ecology and sustainable development in the construction sector. Also, concrete applications to the use of different sustainable construction solutions were examined. (Helsingin kaupunkisuunnitteluvirasto, 2004.)

The state of Finland was, too, actively producing new knowledge through their program for ecological construction⁸, the aim of which was to collect all the ongoing projects of sustainable construction under one frame. This program, started in 1998, consisted of 20 procedures on sustainable construction. Interestingly, most of these were somehow related to the experimental construction projects of Eko-Viikki. (Helsingin kaupunki & Ympäristöministeriö, 2004.)

At the time, Tekes also widened its research sphere from the traditional energy and indoor air-quality examination. Their “Environmental technology for construction”⁹ “-program developed practical methods and technology to diminish environmental impact of buildings. Also, products and services for sustainable building were developed. An essential part of this was also experimental building in order to find functional and replicable solutions. (Helsingin kaupunkisuunnitteluvirasto, 2004.) In order to examine functional solutions in neighbourhood- and area-level, Eco-community -project was initiated in 1994 by Tekes, Ministry of the Environment and Finnish Association of Architects (SAFA

⁶ In Finnish: Ekologisen rakentamisen ohjelma

⁷ A funding agency within the administrative branch of the Finnish Ministry of Education, Science and Culture

⁸ In Finnish: Ekologisesti kestävä rakentamisen ohjelma

⁹ In Finnish: Rakentamisen ympäristöteknologia -ohjelma (RYM)

from here onwards) (Helsingin kaupunkisuunnitteluvirasto, 2004). Eko-Viikki was chosen as one of the experimental areas in this project, along with Ristinummi in Vaasa (Helsingin kaupunkisuunnitteluvirasto, 2004).

4.1.1.4 Advancing collaboration

Other instruments on the landscape level revolved around building a network and collaboration models for the development of sustainable construction and land use. As stated above, Eko-Viikki neighbourhood development was part of Eco-community project which was a joint project between the Ministry of the Environment, SAFA and Tekes (Suomen arkkitehtiliitto, 1997). This triangular of important landscape level actors was seen as a base for the high ambition levels in Eko-Viikki project (H2). The collaboration between these actors was seen to widen the network for the action (H3) as well as to promote a wider culture of collaboration (H2). The combination of actors from different fields of the urban planning was seen as remarkable at the time (H4). It could be therefore said that the whole starting point of building Eko-Viikki neighbourhood displays an aim to collect a new kind of actor network. This wide network was aiming to ensure that the goals of Eko-Viikki would be carried through (Helsingin kaupunki & Ympäristöministeriö, 2004).

4.1.2 Regime level of Helsinki urban planning

4.1.2.1 Plans with sustainability considerations and environmental impact assessments

The regulative instruments of urban planning at the city level include the composition of plans; master plan and detailed plans. In the master plan of 1992, City of Helsinki defined action points to advance the sustainable development of the city structure (Jaakkola, 2012). One of the main objectives of the master plan was to advance sustainable development and densification of the city in order to save energy and protect nature areas (Helsingin kaupunginkanslia, 1992). The master plan of Helsinki was revised again in 2002 (Jaakkola, 2012). The base for the preparation of 2002 master plan was the recently revised Land Use and Building Act, where the most central renewals concerned the plan assessment regulation and resident participation in planning (Helsingin kaupunki, 2002). The revision of the master plan further strengthened the sustainable development thinking by promoting city densification and development of rail traffic (Jaakkola, 2012).

In the more local level, the very first wide environmental impact assessment for a zoning plan¹⁰ in Finland was conducted on the Viikki area, and accepted in 1995 (Helsingin kaupunki & Ympäristöministeriö, 2004). Environmental impact assessment is done for the plans in order to clarify the impacts of the different plan options for the environment (Ympäristöhallinto, 2018a). The assessment is done throughout the preparing process of the plan; the planners themselves assess impacts of their work and, if needed, separate impact assessments are made (Ympäristöhallinto, 2018a). The impact assessment is applied according to the different plan levels and no unified model exists (Ympäristöhallinto, 2018a). As to Eko-Viikki, the assessment and the subsequent recommendations had indeed an impact, and changes were made to the plan of the area. For example, more room was left between the built area and the nature conservation area to protect the nature values. The city also assessed the nature effects of the detailed plan in Eko-Viikki. (Helsingin kaupunki & Ympäristöministeriö, 2004.)

The detailed plan also includes construction practice regulations¹¹ as a supplementary part. Some of the construction practice regulations in Eko-Viikki were binding while some only normative principles, advising how sites and the general areas should be designed. Binding regulations were laid out by the building code¹² of City of Helsinki of that time. Binding regulations, the ones affecting concretely the buildings, were multiple; demand for using glazed balconies or greenrooms, design principles for yards and green fingers as well as technical regulations on waste management, ground construction and management of drainage waters. The appropriate compliance with the binding regulations were demanded to be displayed in the building permit documents. Building practice regulations were considered to be more flexible means of guiding the development than the actual detailed plan. (Helsingin kaupunki & Ympäristöministeriö, 2004.)

Furthermore, the detailed plan of Eko-Viikki included normative principles for the promotion of sustainability of the yard areas. It included requirements to promote storm water management through structural and other means as much as possible. Buildings were also encouraged to be placed towards south so that the apartments could benefit from the natural sunlight. Moreover, experimentation was done with lowering the parking space requirements to see if the real demand for these parking spaces would be lower than demanded. The plan insisted on only half of the normal amount of the parking space normally demanded per person in specific areas with the reservation for expanding the parking

¹⁰ Osayleiskaava

¹¹ Rakentamistapamääräykset in Finnish, nykyään: rakentamistapaohjeet

¹² Rakennusjärjestys in Finnish

areas, if needed. In the end, this possibility to invent other purposes for the parking areas was left unused and the amount of parking spaces in the area is no less than normally. (Helsingin kaupunki & Ympäristöministeriö, 2004.)

4.1.2.2 Economical compromises

Besides the more formal funding mechanisms in Eko-Viikki, emerging from the landscape level, the city of Helsinki also made some exceptions during the Eko-Viikki development process to ease the additional costs; the challenging soil conditions demanded additional work and, therefore, produced extra costs as well. Accordingly, the city made a compromise and reduced the prize of the site rent in order to reduce the living costs that threatened to rise in the area. This easement was also done to encourage the construction developers to invest in the sustainable building experiments. (Helsingin kaupunki & Ympäristöministeriö, 2004.)

4.1.2.3 Extensive follow-up

One of the starting points for the whole Eko-Viikki -project was to document as accurately as possible the planning and building process of the first neighbourhood level sustainability project in Finland (Helsingin kaupunki & Ympäristöministeriö, 2004). The city of Helsinki was in charge of compiling this follow-up information from the different stakeholders into final reports (Helsingin kaupunkisuunnitteluvirasto, 2004.) Documentation of this pioneer project was thought to be important, so the lessons learned during the process could be spread to a wider audience. Specifically, the interest was to see how the PIMWAG-criteria would succeed in guiding the construction to be more sustainable. (Helsingin kaupunki & Ympäristöministeriö, 2004.)

The pioneer project was documented through several follow-up documents. The main reports include the principal document analysis sources in this thesis; the follow-up report of the City Planning Department (Helsingin kaupunkisuunnitteluvirasto, 2004) as well as of the City of Helsinki and the Ministry of the Environment (Helsingin kaupunki & Ympäristöministeriö, 2004). They both provide detailed information about the process, building descriptions and results from the consumption of water, electricity and heating. Other smaller follow-up documents can be found for example on energy consumption (Motiva, 2008) and on solar energy systems (Johansson, 2009).

Even though the follow-up material of the Eko-Viikki project is extensive, the report of the City of Helsinki and the Ministry of the Environment (Helsingin kaupunki & Ympäristöministeriö, 2004) states that the follow-up process was not without difficulties. For the first time ever, this kind of documentation of the procedures as well as the results was gathered and there was not yet a standardized way of doing this in the construction industry. Because of this, there was a lack of established and trustworthy indicators for measuring the sustainability of the construction. The calculation programs, made especially for Eko-Viikki, were noted to be too complex and laborious owing to the lack of simple indicators. Much of the technical information was also hard to access since it was sometimes in the possession of individual persons or simply not available. Furthermore, adequate comparative material was lacking because most of the earlier consumption information available was based on statistics or calculator charts, not on real consumption data that Eko-Viikki provided.

4.1.2.4 City of Helsinki's commitment to sustainability agendas

On the regime level there were other instruments that certainly affected, at least indirectly, the Eko-Viikki project and, more widely, the urban planning of Helsinki in the following years. City of Helsinki started to commit to sustainable development agendas in the 1990's. The United Nations Conference on Environment and Development in Rio de Janeiro in 1992 yielded a long-term sustainable development action plan for the 21st century, Agenda 21, that further led to city level commitments for promotion of sustainable development. The Aalborg Charter, in 1995, started the European Sustainable Cities and Towns Campaign, which was an agreement to initiate Local Agendas for sustainable development. The City of Helsinki also signed the charter and committed to these goals of sustainable development at the political level. (Helsingin kaupunki, 1998.)

In practice, Helsinki's commitment to the sustainability goals was realized through the Local Agenda 21, started in 1997 (Helsingin kaupunki, 1998). The Local Agenda 21, in other words, the Helsinki Action Plan for Sustainability Work included goals dealing with sustainable urban planning; for example, such themes as land use and city structure, transport and mobility, green areas and nature protection, regeneration of suburbs and ecological sustainability in construction, greenhouse gas emissions and energy production as well as energy consumption and saving (Helsingin kaupunki, 2003).

4.1.3 Niche level of Eko-Viikki

4.1.3.1 *Many novel regulative policy instruments*

Many novel regulative instruments were designed especially for Eko-Viikki or used in a new way. One of the strongest policy instruments for advancing the sustainability of the area was said to be the site reservation and transfer conditions (Helsingin kaupunki & Ympäristöministeriö, 2004). These conditions had been used in urban planning already before the Eko-Viikki project but it was in Eko-Viikki where the demands for ecological sustainability were attached to the conditions for the first time.¹³ When handing over the sites, the city of Helsinki required the planners and construction companies to include experimental construction for promoting ecological sustainability of the projects, to fulfil the minimum requirement levels of PIMWAG-criteria, to follow building practice regulations as well as to take part in the follow-up by monitoring and reporting the results of the construction (Helsingin kaupunki & Ympäristöministeriö, 2004). Attaching these conditions to the handover of sites was enabled by the fact that the city and state owned the land in Viikki (H5).

These conditions were thought to be more flexible steering mechanisms than attaching more regulations to the detailed plan to guide the sustainability of the area and its buildings (Helsingin kaupunki & Ympäristöministeriö, 2004). Sustainability demands were also said to have guided builders towards more holistic and multi-professional planning and project steering principles throughout the process, because the demands required versatile and new knowledge base from the planners and building contractors (Helsingin kaupunkisuunnitteluvirasto, 2004).

The essential part of these conditions was the demand to implement the minimum levels of PIMWAG-criteria. The PIMWAG-criteria was a new policy instrument drawn up specifically for the Eko-Viikki area to measure its sustainability. The criteria were developed in order to ensure a good overall level of sustainability and quality, not only to settle for individual innovative solutions. Moreover, there was a need to have criteria with measurable indicators that did not yet exist in Finland at the time. Although international examples of assessment tools for the construction solutions' sustainability could be found (such as BREEAM and GBC), these were thought to be too difficult to apply to the Finnish environment. Hence, a completely new tool was created. (Helsingin kaupunki & Ympäristöministeriö, 2004.)

¹³ Project coordinator of Eko-Viikki (Heikki Rinne), oral statement, 20.8.2018.

The PIMWAG-criteria define the minimum levels of sustainability through five areas: pollution, use of natural resources, health, biodiversity and food. In order to get a wider range of different solutions, the means to achieve the levels was, nevertheless, left for the planners to decide. These five areas include 16 criteria for the assessment. Each criterion was graded from 0 to 2 based on the sustainability level of the project. The minimum sustainability requirements (=0 points) were all, except the electricity, already more sustainable than the normal levels of the building at that time. (Helsingin kaupunkisuunnitteluvirasto, 2004; Helsingin kaupunki & Ympäristöministeriö, 2004.) While the maximum number of points was 30, 20 points indicated that the plan included exceptionally innovative solutions whereas ten points were still considered to be an excellent example of ecological sustainability. In Eko-Viikki, all the projects were discovered to have between 9,5-17,3 points based on the plans. (Helsingin kaupunkisuunnitteluvirasto, 2004).

The table 3 below shows the reference levels for some of the requirements in the PIMWAG-criteria as well as the actual consumption levels. The reference levels were based on the numbers gained from conventional buildings that represented the average level of buildings in Helsinki in the mid-1990's (Helsingin kaupunkisuunnitteluvirasto, 2004). Similarly, the real consumption numbers are also based on the average results of the follow-up on the buildings (Helsingin kaupunkisuunnitteluvirasto, 2004).

	Reference level	PIMWAG-minimum requirement	Real consumption
Consumption of water	160 litres/per resident/ per day	125 litres/per resident/per day (-19 %)	126 litres/per resident/per day
Heating energy	160 kWh/ brm ² , a	105 kWh/ brm ² , a (-34 %)	120,3 kWh/ brm ² , a
Electricity	45 kWh/ brm ² , a	45 kWh/ brm ² , a (0%)	44,89 kWh/brm ² , a
CO2 emissions	92 kg/ brm ² , a	67 kg/ brm ² , a (-20 %)	73 kg/ brm ² , a

Table 3. Comparison for PIMWAG-requirements (Helsingin kaupunkisuunnitteluvirasto, 2004)

The table exhibits that the ambition level of the minimum requirements in the PIMWAG-criteria varied between the different areas measured. Interestingly, as for the consumption of electricity, no

reductions to the reference level were demanded.¹⁴ On the other hand, the requirement for heating energy was stricter and imposed over 30 % reductions to the reference level.

The follow-up results (Helsingin kaupunkisuunnitteluvirasto, 2004), a few years after the area was built, indicated that the water and electricity consumption in Eko-Viikki was following on the average the minimum requirements of the PIMWAG-criteria. On the other hand, the consumption of heat was 15 % over the PIMWAG- minimum requirement. It was speculated that the factors contributing to this higher consumption of heat were the bigger household size and higher population density in the area compared to the other parts of the city. Similarly, it was noted that, at the time of the follow-up, the area was still only few years old while normally the property's energy consumption settles to its final levels in 2-3 years after end of its construction.

Some difficulties were however faced in compiling this measurement tool. The task of compiling a completely new criteria to assess sustainability of the construction was complex, and naturally some compromises had to be made to choose which indicators to include in the criteria and which not to. The tool was also regarded as a heavy and demanding to use by all stakeholders of the process; planners, construction companies and city representatives. It was, thus, found impractical for a wider use in urban planning. Overall, compiling of this kind of criteria was, nevertheless, considered vital in order to guide the neighbourhood towards sustainability, and as a pioneer work at that time it gained wide interest abroad as well. (Helsingin kaupunki & Ympäristöministeriö, 2004.)

4.1.3.2 No economic instruments

The initial idea in the PIMWAG-criteria was to develop a system where the projects would have received an additional financial support based on their PIMWAG-points (e.g. from TEKES). The more ambitious the project would be, the more points it would get, and thus also more financial support. However, at that time, this kind of financial system was found to be impossible to execute. (Helsingin kaupunki & Ympäristöministeriö, 2004.) This kind of encouraging funding mechanism falling flat was seen as one of the reasons for the lack of more ambitious projects and innovative technical solutions from the construction developers (H6). In the end, no economic policy instruments were applied at the niche level.

¹⁴ Project coordinator of Eko-Viikki (Heikki Rinne), oral statement, 20.8.2018: "No reductions were demanded for electricity because new technologies of heat recovery ventilation were assumed to use more electricity".

4.1.3.3 Difficulties in the dissemination of information

At the niche level, there were some informal means to spread the information during the Eko-Viikki building process, but they were found to be insufficient. The information for the relevant stakeholders of the process, mainly for the construction developers, was spread by some individual seminars and meetings. For example, after the building permits were given, the Building Control Department arranged a one-time coordination meeting where the stakeholders participating in the construction process were informed about the specific demands of the Eko-Viikki area. (Helsingin kaupunki & Ympäristöministeriö, 2004.)

There was also an aim to inform the construction contractors, house managers and residents about the goals and special features of the buildings. The responsibility for disseminating this knowledge was left to the construction developers. However, no specific procedures were used to aid this process and the follow-up report states that the information was not always conveyed to the stakeholders as it was planned. (Helsingin kaupunki & Ympäristöministeriö, 2004.) For example, the landlords of the area told, when interviewed during 2002-2003, that they did not have enough information on the area's sustainability goals. Similarly, the maintenance companies were also lacking the relevant information on the maintenance of the new technological solutions (Helsingin kaupunkisuunnitteluvirasto, 2004.)

Overall, it was noted that the stakeholders participating in the realization of the PIMWAG-criteria goals were many. The chain runs from planners, construction developers, construction contractors and subcontractors to landlords as well as from maintenance companies ultimately to residents. Unfortunately, information failed to successfully flow through this chain, and this was remarked to be one of the things that require a clear improvement in the future. Indeed, the dissemination of knowledge from the planning organisations to the construction contractors and all the way to the maintenance phase was noticed to be one of the major issues that is, unquestionably, to be developed. (Helsingin kaupunkisuunnitteluvirasto, 2004.)

Furthermore, an important part of the Eko-Viikki project was the dissemination of the result from the experimental building and planning process results to wider audience in order to spread the lessons of the project. This kind of distribution of information was executed mainly by the leaders of the Eko-Viikki project. The Eko-Viikki project was presented through participating in numerous international conferences, expert meetings and seminars as well as by compiling publications. In fact, Eko-Viikki

has gained a wide interest and has been visited by many expert groups from Finland and abroad. (Helsingin kaupunki & Ympäristöministeriö, 2004.)

4.1.3.4 New collaboration methods and planning competitions with sustainability demands

Planning competitions were used for steering the Eko-Viikki project towards high sustainability ambitions already from the start. As such, planning competitions are normal procedures. However, what was special about the planning competitions in Eko-Viikki was the requirement to take the ecological sustainability to the plans (H1, H3) as well as the broad cooperation between different experts in the planning (H1).

A general idea competition was arranged between 1994-1995 in order to find new solutions for the detailed plan of the area (Helsingin kaupunkisuunnitteluvirasto, 2004). The competition started in 1994 with a seminar, where experts from relevant fields were invited to discuss about the cities' possibilities to address sustainability issues and they were encouraged to form multisectoral expert groups for the competition (Helsingin kaupunki & Ympäristöministeriö, 2004). Besides the general planning principles of functionality, liveability and economic principles, the competition also required that ecological sustainability aspect would be considered in the plans (Helsingin kaupunkisuunnitteluvirasto, 2004). The competition provided a detailed plan, but also new information and solutions for sustainable urban planning and, hence, enhanced the Eko-Viikki project's aim to be educationally significant as well (Helsingin kaupunki & Ympäristöministeriö, 2004).

Similarly, a competition for planning solutions on the level of residential quarters and buildings was also organized in order to get experimental solutions for sustainable building. This planning competition also promoted multisectoral cooperation and, according to the rules, every group participating in the competition had to have experts with versatile knowledge including architect, structural engineer, HPAC¹⁵- and electricity planner, ecology expert as well as building contractor. To ensure that the plans would be executed, the contractor of these projects was also taken into to the planning phase. (Helsingin kaupunki & Ympäristöministeriö, 2004.)

Furthermore, other policy instruments included also a new collaboration method. The collaboration method for the steering of the area was inspired by the group-work methods used in "Hitas"-areas, land areas owned by city of Helsinki where the costs and quality are controlled. This area specific

¹⁵ Planner of the heating, water and air conditioning systems in a construction project

working group¹⁶ consisted of a project leader from the city, a planning architect, a permit architect granting the building permissions, a construction developer and an urban planner. The area working group was responsible for steering of the different part-projects of the area development and one of its main tasks was to go through and give feedback on the construction plans. Before the planners submitted their building permit application to the Building Control Department, the area working group went through the main drawing drafts, PIMWAG- announcement with its calculations and explanations as well as the experimental construction proposals of the plan. This gave planners feedback in the early phase of the planning and enabled them to adjust their plans for the building permit phase, if needed. (Helsingin kaupunki & Ympäristöministeriö, 2004.)

However, the assessment of these special plans, and calculations that they contained, proved to be difficult and laborious. The calculation programs for energy consumption and emissions used in the competition phase were, actually, not suitable for the planning phase calculations. For example, there was a lack of information about the quantities of the materials in the planning phase. Hence, the calculations for the energy consumption and emissions of the building materials were soon left out from the assessment process. (Helsingin kaupunki & Ympäristöministeriö, 2004.)

¹⁶ Alueryhmätyöskentely in Finnish

	REGULATIVE INSTRUMENT	ECONOMIC INSTRUMENTS	INFORMATIVE INSTRUMENTS	OTHER INSTRUMENTS
LAND-SCAPE	<ul style="list-style-type: none"> - Land Use and Building Act <ul style="list-style-type: none"> • Complete renewal came to effect year 2000, taking sustainable development as an overarching goal 	<ul style="list-style-type: none"> - Tekes-innovation funding - <u>Funding from EU-programmes to individual experimentation projects</u> 	<ul style="list-style-type: none"> - Research programs on sustainable building - Follow-up (the Ministry of the Environment) 	<ul style="list-style-type: none"> - Advancing collaboration and network for sustainable construction and land use planning
REGIME	<ul style="list-style-type: none"> - Master Plan <ul style="list-style-type: none"> • Sustainability issues more considered - Zoning plan <ul style="list-style-type: none"> • <u>Environmental impact assessment</u> - Detailed plan <ul style="list-style-type: none"> • Building practice regulations • Nature effect assessment • Demands for the sustainability of the yard areas 	<ul style="list-style-type: none"> - City reduced the prize of the site rent 	<ul style="list-style-type: none"> - Follow-up (City office of Helsinki) 	<ul style="list-style-type: none"> - City of Helsinki engaging in sustainable development agendas <ul style="list-style-type: none"> • Agenda 21(1992) ->Aalborg charter (1995) -><u>Local Agenda 21 =Helsinki Action Plan for Sustainability Work</u> (1997)
NICHE	<ul style="list-style-type: none"> -Site reservation and transfer conditions <ul style="list-style-type: none"> • <u>Conditions for the level of sustainability</u> • <u>Use of PIMWAG-criteria as mandatory</u> 	x	<ul style="list-style-type: none"> - Informal, individual means in disseminating information inside the process and to wider audience 	<ul style="list-style-type: none"> - Area-working group as a project steering method - Planning competitions <ul style="list-style-type: none"> • <u>Requirements for ecological sustainability</u>

Table 4. Policy instruments used during planning and construction between the years 1994 and 2004. Policy instruments are divided based on the MLP level (Geels & Schot, 2007) and policy instrument type (Mickwitz, 2003). Instruments used for first time, or in specific new manner, in Eko-Viikki are underlined in the table. Instruments that could not be found, are marked with “x”.

4.2 The changing sustainable urban planning instruments

This chapter describes the changes in the policy instruments after the construction of Eko-Viikki, between the years of 2005 and 2018. It discusses which of the new policy instruments used in Eko-Viikki have been used afterwards in the urban planning of Helsinki, and what kind of changes have taken place in landscape and regime level regarding formal instruments, such as laws and master plans. Naturally, some of the instruments used in Eko-Viikki were one-time instruments, like specific funding arrangements, and therefore, they are not included in this work.

4.2.1 Landscape level

The interviewees of this research had clearly marked tightening of regulations in the socio-technical landscape; regulations were said to have become more stringent throughout the years in ever quickening pace. Also, the document analysis verifies this trajectory. After the renewal of the Land Use and Building Act in 2000, it has constantly changed to include more and more sustainable development and climate change mitigation issues (Ympäristöministeriö, 2014).

For example, in 2005, Land Use and Building Act was amended to include environmental impact assessment as mandatory for land use plans (Land Use and Building Act 202/2005, 9§). This amendment became necessary due to changes in the landscape level, most importantly, due to EU-level SEA-directive (Ympäristöministeriö, 2017a). Furthermore, in 2018, the national land use guidelines were revised to include objectives how to respond to challenges such as climate change, urbanisation and digitalisation (Ympäristöhallinto, 2018b). Overall, the revised objectives are directed towards supporting the transition to low-carbon society in Finland (Ympäristöhallinto, 2018b).

Above all, energy efficiency demands and emission reductions have become more central in the zoning and construction fields after the Land Use and Building Act of the year 2000 came to effect (Ympäristöministeriö, 2014). In 2010, the EU gave a directive on energy efficiency of buildings that seeks to reduce energy use and to increase the share of renewable energy in the energy use of buildings (Ympäristöministeriö, 2017). In order to implement this in the Finnish legislation, different measures have been made or are under development. In 2013 for example, the law on energy certificate for buildings came to effect which demands that the certificate must be acquired for all new buildings and also when the building is sold or rented (Ympäristöministeriö, 2018b).

Furthermore, energy use reductions are sought by an objective where all new buildings in EU should be nearly zero-energy ones by the end of 2020 (Ympäristöministeriö, 2017b). The legislation for zero-energy buildings is under preparation in Finland (Ympäristöministeriö, 2017b).

Interviewees had also noted the emphasis on the energy efficiency of buildings in the legislation changes. Even though the interviewee from the Ministry of the Environment stated that the strongest steering instruments for construction are still in the energy sector (H2), the official regulations in state level are gradually starting to integrate also other issues to the steering of sustainable construction. The direction is towards more holistic stance in low-carbon building steering where also the carbon footprint of building materials is taken into consideration. This is one of the top priorities for development in the Ministry of the Environment by 2025. (H2.) One interviewee (H4) highlighted this fast change by stating that, nowadays, regular buildings are more energy efficient than the buildings built to Eko-Viikki.

“--after Eko-Viikki, if one thinks of the criteria that was created there, quite quickly the legislation changed too and as if affiliated to them. Now if one looks at the basic indicators of Eko-Viikki, the energy efficiency of buildings and these kinds of things, they are a commonplace. At that time, the energy efficiency was improved by one third of the average and now it is a B-level building. --” (H4)

Two of interviewees (H4, H5) saw that Eko-Viikki had influenced on the tightening regulation by showing a positive example. The Eko-Viikki project proved that stricter demands could be achieved by simple solutions and the construction developers did not see these demands as immoderate. Hence, the experiences of this project demonstrated the Ministry of the Environment that it is possible to make the construction regulations more stringent. According to H4, it is often difficult to realize a tighter regulation if there is no experimentation platform. Overall, importance of the influences and concrete directives from EU-level were still acknowledged (H2, H3).

At the moment (year 2018), a general reform process of the current Land Use and Building Act is in progress again. The reform aims to simplify the land use planning system, to develop the steering instruments of construction as well as to facilitate the execution of the law (Ympäristöministeriö, 2018a). Similarly, the renewal also focuses very much on responding to the changing operational environment, that entails such phenomena as climate, energy, low carbon and life-cycle issues as well as digitalisation, to name a few (Ympäristöministeriö, 2018a).

In the nation level, interest in experimentation has also stayed in the agenda; in 2017 the Finnish government announced starting a five-year long program on Finland's national sustainable city development which is carried out and based on the principles of experimentation culture. Tangible pilot projects are part of this. The program is coordinated by the Ministry of the Environment in cooperation with cities, but a wider collaboration is extended to include also other actors such as companies, institutes of higher education and civic society actors. (Ympäristöministeriö, 2018c.)

The interviewee from the Ministry of the Environment (H2) told that the policy tool used in Eko-Viikki, the PIMWAG-criteria was further developed into different sustainability indicator tools in the landscape level. Based on the experiences of the PIMWAG-criteria and international tools of BREEAM and LEED, the PromisE -tool was created to assess and classify the sustainability of both new buildings and already existing ones. The Ministry of the Environment was involved in developing the PromisE -tool as the need for an indicator tool measuring the sustainability of construction was considered very important. However, it did not come widely into use in Finland. Later on, the PromisE tool has been developed further into a new RT-environmental tool for assessing sustainability of buildings and into a related RTS -environmental classification. (H2.) According to the owner of the tool, Rakennustieto, the RT-tool is adjusted to the Finnish context and is a less laborious tool than BREEAM and LEED.¹⁷

In contrast to this development, one interviewee (H1) questioned the need to have separate criteria in Finland for assessing sustainability of buildings as there are functional international alternatives, such as BREEAM. The interviewee (H1) saw that international criteria tools have also the benefit of allowing easy comparison between international examples and thus providing learning opportunities from abroad. Similarly, the interviewee (H1) thought that another advantage of BREEAM is the fact that it is an expert assessment and does not include, contrary to PIMWAG, heavy and laborious calculations.

In a way, this further development of the indicator tool could be seen to correspond slightly to the initial idea of PIMWAG-criteria as an updatable tool. The PIMWAG-criteria was intended to be a flexible and open tool that could be updated and developed along with the advancements of scientific knowledge (H6). Noteworthy is the fact that the use the RT-tool and earlier PromisE tool, is voluntary, and they are focusing mainly on the building level sustainability. By contrast, in Eko-Viikki the use

¹⁷ <http://glt.rts.fi>

and the area-level sustainability perspective were mandatory parts of the PIMWAG-criteria (Helsingin kaupunki & Ympäristöministeriö, 2004).

Even though standardized sustainability indicator tools, or even an agreement on the best tool, seems still to be missing, there is a clear need for tools to assess the sustainability of building. According to the interviews, the assessments concerning building level sustainability were seen important worldwide. The assessment procedures have not, however, become mainstreamed because they always demand extra resources compared to normal construction. Yet, the interviewee from the Ministry of the Environment saw it as a valuable addition on the top of the regulative steering (H2).

4.2.2 Regime level

At the regime level, the most recent master plan for the city of Helsinki was accepted in 2016 (Helsingin kaupunkisuunnitteluvirasto, 2017) and continues with the same sustainability trajectory as the two earlier master plans, discussed in the previous section. The plan has multiple features for enhancing sustainability of the city. The emphasis is on creating a network city which has multiple smaller centres in addition to the city centre. Downtown type of construction is extended further away from the city centre by developing city boulevards instead of the current motorway type of traffic routes. Densification of the city structure is carried out by concentrating one third of the allotted construction to infilling the already existing built areas. The conditions for walking, cycling and public transportation are improved. Furthermore, the green areas and recreational areas are built as a mesh extending throughout the city. (Helsingin kaupunkisuunnitteluvirasto, 2017.)

In the political decision-making level, the goals for urban sustainability are laid out in the city strategy and environmental policy which are approved by the city council, as well as in the budget guidelines approved by the city government (Helsingin kaupunkiympäristön toimiala, 2018). The newest city strategy of Helsinki for the years 2017-2021 clarifies goals for more ambitious environmental policy in the city. By 2030 Helsinki aims to reduce its emission by 60 % from the level of the year 1990 whereas, by 2035, it strives to be completely carbon neutral (Helsingin kaupunkiympäristön toimiala, 2018). Actually, the carbon neutrality goal has quickly advanced as, in 2015, Helsinki declared to be carbon neutral by 2050 (Helsingin kaupunki, 2015). Besides the environmental goals in the city strategy, the city of Helsinki has also objectives in its environmental policy for medium term (2020) and long term (2050) (Helsingin kaupunki, 2012). The goals include such areas as climate, air, water, nature and soil protection, noise abatement, procurement, waste and material efficiency,

environmental awareness and responsibility, environmental leadership as well as partnerships (Helsingin kaupunki, 2012). In addition, the city has nowadays numerous programs for different areas of environmental protection, such as Carbon Neutral Helsinki 2035 -action program, that realizes the environmental goals (Helsingin kaupunkiympäristön toimiala, 2018).

From the policy instruments used in Eko-Viikki, the site transfer conditions have been afterwards integrated to the Helsinki urban planning methods, and Helsinki has, for example, demanded in them stricter levels of energy efficiency for the buildings than what is demanded in national level (Helsingin kaupunki, 2018). Interviewees stated that site transfer conditions are, indeed, effective means to steer the area projects towards more ambitious sustainability goals when the land is owned by the city, as it was the case in Eko-Viikki. In Helsinki, the city is the most remarkable landowner as roughly 60 % of the all construction takes place in the city owned and transferred sites (Helsingin kaupunki, 2018). This makes transfer conditions very usable policy instrument. Furthermore, the interviewees considered the site transfer conditions to be more flexible and lighter way to steer area sustainability compared to, for example, to plans. On the other hand, concerns about the applicability of this method in the future were raised, because the procedure is laborious and there has been a decrease in the city's personnel resources to steer this (H4).

Interviewees informed that area working group practice has also been used later on and it has become a somewhat established part of Helsinki urban planning procedures. Especially in the area construction projects coordinated by project leaders, the working group is a viable option. Although, the area working group was implied to not be in use in all of the urban planning and not as organised as in Eko-Viikki, but still the idea of evaluation meetings of several parties has remained in the toolkit of the city (H3).

4.2.3 Niche level

In the interviews, the PIMWAG criteria was thought to be one of the biggest achievements concerning the Eko-Viikki area development and its innovations. Nevertheless, the PIMWAG-criteria was also considered to be too complicated and laborious to be applied as it was later on in the Helsinki urban planning (H5). A simplified version of it was later used in the planning and building of the other parts of Viikki, focusing especially on energy consumption reductions (H5).

	REGULATIVE INSTRUMENTS	ECONOMIC INSTRUMENTS	INFORMATIVE INSTRUMENTS	OTHER INSTRUMENTS
LANDSCAPE	<ul style="list-style-type: none"> - Land Use and Building Act <ul style="list-style-type: none"> • Many amendments concerning especially energy efficiency 	X	X	<ul style="list-style-type: none"> - Sustainability indicator tool development for construction, inspired partially by PIMWAG-criteria <ul style="list-style-type: none"> • RT-ympäristöluokitus
REGIME	<ul style="list-style-type: none"> - Master plan <ul style="list-style-type: none"> • Sustainability goals as more integrated part - Site reservation and transfer conditions used in the urban planning 	X	X	<ul style="list-style-type: none"> - City of Helsinki engaging in quickening pace to sustainable development in agendas and in city strategy - Area-working group used in the urban planning
NICHE	<ul style="list-style-type: none"> - PIMWAG used later on in other parts of Viikki planning as bared down version 	X	X	X

Table 5. Policy instruments used after planning and construction between the years 2005 and 2018. Policy instruments are divided based on the MLP level (Geels & Schot, 2007) and policy instrument type (Mickwitz, 2003). Instruments that could not be found, are marked with “x”.

4.3 Complexity of urban planning regime transitions

This chapter concentrates on the results from the interview materials describing the possible sustainability transitions taking place in the regime of Helsinki urban planning as well as the context around Eko-Viikki and Helsinki urban planning case in general. The chapter is further divided under the regime parts of technology, policy, culture and markets. These were the parts of the regime that interviewees were themselves talking about. No clear mentions of science and its changes was presented in the interviews.

4.3.1 Fast paced development of technology

The changes in the technology for sustainable construction and land use planning were thought to be remarkable throughout the years under study (1994-2018). All but one of the interviewees (H3) mentioned that technology especially for sustainable construction, but also for land use planning, has developed enormously and at a very fast pace during the last decades. One interviewee explained that during the planning of Eko-Viikki the technology was not sufficient for all the planning schemes introduced when Eko-Viikki was built (H5). Furthermore, the sustainable technology solutions used in Eko-Viikki, such as solar panels, were criticized for being an additional feature in the buildings. Whereas nowadays, the sustainability technology is taken as more integrated part of the buildings. In the 1990's the prices of technology were also high due to the lack of technology providers. The quotation from the PIMWAG-criteria planner describes this development well.

“And my thesis here is that we have lived in society where there are unlimited resources and limited technology. Now we are moving to society where there are limited resources and unlimited technology. So, this technological development is totally absurd! In the way that in 10 years, without doing anything, we can make houses that are four times more energy efficient.” (H6)

Some fields of technology were seen to have developed more than others. Especially, advances in energy production technology were mentioned the most. Interviewees were talking about the fast-paced development of solar panel technology which has simultaneously lowered the prices during the last decades. One interviewee highlighted this by stating that the solar panel experiments in Eko-Viikki were not considered the most successful ones, partially because the technology was so new at that time (H4). Geothermal heating was also mentioned to have become more common, mainly in private houses, after Eko-Viikki was built. Furthermore, storm water management was mentioned to be taken remarkably more into account in the urban planning; Helsinki has, nowadays, even a strategy for the storm water management. Furthermore, one interviewee (H4) thought that the development of technology has been faster in the system level, such as in energy production and mobility systems, than inside the construction technology.

4.3.2 Complexity of urban planning and its policies

The interviews touched upon various themes that were related to policy domain and that affect the Helsinki urban planning transition in multiple ways. In the concrete urban planning level, the hopes were high that Eko-Viikki development would have led to similar sustainable neighbourhood projects with high ambitions. However, half of the interviewees were pondering that after Eko-Viikki there has not been any examples of this type of sustainability development for a long time. Interviewees mentioned that, only in recent years, the area of Kuninkaantammi has demonstrated to be a somewhat similar type of sustainability project.

“-- it happened to the city, that this was this kind of experiment and then we maybe went a little backwards, because this kind of criteria was not developed elsewhere. This Kuninkaantammi is the next of this kind that has started to develop especially the ecological building.” (H3)

Furthermore, it seems that sustainability issues have not yet been mainstreamed to the everyday work in urban planning. An interviewee from the Urban Environment Division of the City of Helsinki (H4) stated that the people inside the planning department have varied interests and also know-how as far as for integrating the sustainability issues into their work. Still, sustainability issues have slowly started to become part of the everyday work in urban planning as a new generation of employees, exposed to the sustainability issues already in their studies, have come to the field. This can be seen, for example, in the way the master plan integrates principles of ecological sustainability. The disparity between individual urban planners on the knowledge and know-how in sustainability might be explained by one comment from a former urban planner (H3); the urban planning department has not really had general guidance or tools how to integrate sustainability to the planning work.

Even though the interviewees saw that the urban planning office employees were irregularly integrating principles of ecological sustainability to their work, the political agendas were seen to have changed to be more and more ambitious. Interviewees informed that City of Helsinki has compiled and committed to ambitious sustainability goals in the political level in recent years.

“--we have done environmental program and climate-program that set huge goals already by the year 2030. Attainment of these goals demands participation of the whole city organization and also slightly of the inhabitants.” (H4)

Furthermore, the ideology of urban sustainability planning was said to have changed during the years by one interviewee (H4). The interviewee said that Eko-Viikki project, in the 1990's, represented the old ideology of green and sparsely populated eco-city, with sustainability technologies attached, whereas, nowadays, sustainability of the city is seen to consist of features such as compactness and eco-efficiency. The discussion in the urban planning field has turned into promotion of climate smart cities.

Moreover, the interviewees that had worked on the urban planning inside the city of Helsinki raised the issue of urban planning complexity. Urban planning was stated as involving constant balancing between different goals with different time spans. Short term goals of maintaining the level of current services and industrial policy might be controversial to the long-term goals of sustainability of the city.

“Helsinki has challenges in this how we grow sustainably. Qualitatively sustainably. It is a challenge all of us. I believe we can make it, but it requires that everyone understands how long-term investments are made.” (H4)

Interviewees stated that compromises must, inevitably, be done between decisions concerning different dimensions of sustainability. The compact city goals might create difficulties in developing systems for storm water management. Leaving room for recreational green areas inside the city was seen controversial as regards reducing energy use created by the city structure.

“But of course, it is possible to raise some issues to the zoning. Maybe more like these smaller things, for example storm water management etc. These are still zoning issues. But now that we build so compactly, infiltrations are not possible any more. And then, on the other hand, compact building results in compact city structure and shorter distances and services closer and traveling diminishes. There is kind of things that are kind of opposites, others are bigger and others smaller--” (H3)

In the interviews, the discussion concerning the policy changes in Helsinki urban planning were focusing very much on the extent to which of the city policies concerning land use planning and construction can affect sustainability. Furthermore, the interviewees pondered which types of policy decisions have the biggest impact on sustainability changes in the field, and which organisations do have the most power. The city council, the city government and the municipal boards were seen to be the actors which have the biggest impact on the decisions on sustainability of urban planning as

they accept the plans and make budget decisions (H5). Indeed, these governmental bodies accept the detailed plan, which was seen, by interviewees, as strong steering instrument because of its legally binding nature. Besides the fact that they accept the plans, these governmental bodies are also responsible for more strategical level decisions, such as different development programs that also guide the planning decisions (H4). The biggest decisions, such as city development policies towards more sustainable means of mobility, were said to be made in these development programs (H4).

The governmental bodies of cities were seen to have the most power when dealing with such big decisions as area development (e.g. city boulevards in the future). These decisions that affect the whole city have the biggest impact, because they influence the already existing areas (H4). Steering of the new area construction projects was seen as a small-scale action. Similarly, improving the energy efficiency of old buildings was seen as a more urgent need than focusing on the new construction designed already according to quite energy efficient principles. The action of infilling the existing built-up areas was also seen as important, but unfortunately city cannot influence this much, as the land is frequently owned by private actors.

“--Of course, we bring these and demand and require these (sustainability requirements), but in order to them go through the whole city...so with zoning the population of Helsinki increases 1,5 % per year. New floor space is being generated so little in a year that the new construction changes the city very slow. For that reason, I believe, that these things that steer the city development the strongest, are those things that affect the whole city structure. Traffic system level things and mobility and such, which affect how the already existing urban areas can be developed.” (H4)

The importance of system level decisions in steering the urban sustainability were also brought forward through interviewees pondering on the power of the city of Helsinki to influence energy production. The energy company Helen is owned by the city and, therefore, the city of Helsinki has the power to change the energy production of Helen into more sustainable. Energy system decisions were said to have a big impact on the sustainability of Helsinki.

” ---I talk quite much about the energy efficiency of buildings, because it is quite central. Through that you can see that many other things are only things that have an effect on the surface. ---I believe that we are exceptional in Europe, Helsinki for example, in how big amount (of houses) have central heating district in use. After all, as Helen is a public utility, the actions of Helen are in the hands of Helsinki (city). Those definitions of policy that politicians make concerning that, and how we get to those, it has really big influence. ---Then on the other hand, also the good old energy efficiency. Neither of these is related to zoning matters as such. ---They are very central issues concerning the emissions.” (H4)

Local solutions, such as storm water management, were seen to have minor contribution to the sustainability compared to issues containing the whole city level, such as energy production systems. Also, basic planning factors, such as areas’ location in relation to services and the city centre as well as the level of public transportation was seen as important.

4.3.3 Culture and markets intertwined and difficult to change

Even though the city as an organization was seen to have power, interviewees acknowledged that the city cannot carry out the urban sustainability changes by itself. Neighbourhood sustainability goals need to be supported also by the maintenance phase actors and by the behaviour of citizens. The interviewees told that this need was already remarked in the follow-up results of Eko-Viikki (referring to: Helsingin kaupunkisuunnitteluvirasto, 2004; Helsingin kaupunki & Ympäristöministeriö, 2004) which showed a significant variance between the levels of water, electricity and heating consumption. According to the interviewees, the detected reasons for the variance of consumption levels between different houses in Eko-Viikki were misuse or simply lack of use the technology provided by both from the residents’ and house managers’ side. Apartment-specific water meters were installed to most of the houses, but these were not used because the distance reading of the meters were not working at the beginning and, hence, the readings were not reliable.¹⁸ Therefore, the water use was charged as normally per resident or floor space, not by the actual water consumption.¹⁹ One interviewee (H3) stated that a common fact, and the best way to reduce consumption levels, is when people pay for their own water and electricity. All in all, interviewees emphasized the sufficient knowledge and attitudes as significant factors in the maintenance and user phase.

¹⁸ Project coordinator of Eko-Viikki (Heikki Rinne), e-mail, 15.2.2019.

¹⁹ Project coordinator of Eko-Viikki (Heikki Rinne), e-mail, 15.2.2019.

The importance of communication through the maintenance phase also emerged in the interviews. The responsibility of construction companies to inform the real estate manager and their responsibility, in turn, to pass on the information to the maintenance companies and to their changing staff, was not regarded as successful in Eko-Viikki. According to the interviewees, construction developers quite often see that the maintenance phase is not their responsibility anymore.

“--it was found in the follow-up (2004) that the maintenance of the property is very important. Even though education was tried to be arranged there for the real estate managers in the early phase, but the turnover is very high. When the next janitor comes there, he hasn't necessarily heard that those (buildings) have something special about them. Those solar heating systems had summer-winter switch. Like, if one doesn't remember to turn it, then--” (H5)

Related to the topic of culture and markets, some issues were also discussed concerning the demand for sustainable construction nowadays. Interviewees had no consensus whether sustainable construction is seen as a selling advantage by the construction companies or not. One respondent (H4) said that the energy efficient and climate smart construction is, indeed, seen as a selling advantage from the construction companies' point of view. However, another one (H6) had a different opinion; the companies do not want to take the risk of doubled planning expenses in the case the project plan, containing new sustainability solutions, does not get accepted in the first round. Furthermore, the same interviewee stated that customers still see sustainability as expensive and, therefore, unpleasant feature and are not interested to invest in that in the housing markets.

Furthermore, the construction industry was seen as an obstructing actor in developing the housing markets to more sustainable ones. When talking about markets, most of the interviewees were talking about the construction industry's tendency to stick to the old patterns of doing, as well as the tendency to place the maximisation of profits as the first priority in their work. This sector was seen, after all, as a business and, where most companies were said to implement the construction work only with the mandatory minimum requirements in order to maximise the short-term profits. On the whole, construction industry was seen to act mainly inside the limits of the official regulations and requirements in Finland.

“-- if there is something that the regulations don't demand, then it is very hard to realize. The tradition in the construction industry in our country is so that it goes somehow through the authorities. When it is written to the law, decrees and regulations, then it is carried out. That kind of, like, going over the basic level you don't really see.” (H1)

In the case of Eko-Viikki the hopes were high in the sense that construction companies would, after the project, start further developing the sustainable building innovations after the project, but interviewees could not subscribe that this would have happened. Construction industry was not seen to actively develop innovations or experimental building projects after Eko-Viikki. It was, therefore, described as a conservative field, and even to be the least innovative of Finland's industry sectors. The interviewees regarded that construction companies lack commitment to long-term area development. To address this challenge, regulations were seen as a vital element in steering the industry towards more sustainability oriented. One interviewee (H4) speculated that the reason for the lack of eagerness to innovate was that the market economy in the construction industry does not work well in a small country like Finland. When there are plenty of available plots and the profits are good, there is no reason to develop the products further. However, the same interviewee commented that despite all the conservativity claims, construction industry has, indeed, tried to address the challenges of rising sustainability issues and has develop the methods of the field somewhat in recent years (H4).

5 DISCUSSION

This section, concentrating on the discussion of the results, is divided into two parts. First, the different types of instruments used, directly and indirectly, in the Eko-Viikki neighbourhood governance and their relevance for an urban sustainability transition in Helsinki are discussed. This is done through comparing the findings to the literature on governance and policy instruments in urban sustainability transitions as well as to earlier studies on the Finnish urban planning. Secondly, the possible sustainability transition process taking place in Helsinki urban planning is explored by means of transition literature.

5.1 Policy instruments and governance in urban sustainability transitions

The results of this thesis indicate that it is essential to examine policy instruments and governance processes as they have an important role in steering of urban sustainability transitions. First of all, according to the results, the niche level policy experimentations have a potential to affect the regime and its current practices. Out of different policy instrument types (Mickwitz, 2003), a couple of the regulation and collaboration related policy instruments used in Eko-Viikki have been scaled up for the use in urban planning in Helsinki.

As for the regulative instruments, the site reservation and transfer conditions were found to be a flexible but strong policy instrument to promote sustainability and they have been used in the urban planning of Helsinki to require even stricter sustainability actions than those demanded by national level regulations. However, as a strong landowner Helsinki is quite a unique city in Finland, but especially on worldwide scale. For comparison; the city of Helsinki owns 63,9% of its land area (Helsingin kaupunkiympäristön toimiala, 2017), whereas the share of ownership of the city of Tampere is only 24% (Hyötyläinen, 2015). The use of this instrument might, however, diminish even in Helsinki in the future. As the interviews revealed, the bureaucratic handling and approval process of sustainability demands with every site transfer is laborious. At the same time, resources were said to be diminishing in the city department that is responsible for handing over the sites.

Also, the area working group, the policy instrument focusing on collaboration methods, was discovered to be a viable policy instrument to steer an urban planning project with sustainability aims. Hence, the method has been taken as part of Helsinki urban planning practices, especially in the area construction projects. In the context of planning and building with sustainability demands the

importance of functional collaboration methods was highlighted by the interviewees. Similarly, Loorbach and Shiroyama (2016) state that policy instruments used in promoting the urban sustainability transitions should better take into account the wide range of people and interests involved in the process. Making sustainability issues as an integrated part of the everyday urban planning requires co-operation between professionals from many different fields that somehow must find a common language and the will to drive sustainability issues forward. Even though the collaboration methods have been more in the focus in urban planning since the Eko-Viikki project, one of the interviewees (H2) still highlighted the need for further strengthen the cooperation between different actors.

Moreover, an another Eko-Viikki policy instrument, the PIMWAG-criteria, has been used as an inspiration in developing further the sustainability indicator tools in Finland. Even though the PIMWAG-criteria was noticed to be too laborious for everyday use in the urban planning, it provided lessons that could be learned from and be developed later on. Accordingly, on the basis of experiences from the PIMWAG-criteria, and from examples of such international tools as BREEAM and LEED, as well as domestic indicator tools, the PromisE, and most recently, the RT- environmental tool were developed. Overall, there are already plenty of tools for measuring the ecological sustainability of cities, that vary in their breadth and assessment methods (Säynäjoki et al., 2012). One of the interviewees of this research did, indeed, question the need to have an own indicator tool in Finland. On the other hand, one comprehensive Finnish study on indicator tools stated that the international tools are often expensive, slow and laborious to use (Säynäjoki et al., 2012).

Furthermore, it should be noted that the use of existing indicator tools (RT-environmental tool etc.) is voluntary-based. Therefore, they are tools for planning, not for regulation. In contrast, the PIMWAG-criteria had also a regulative aspect as the use of it was required in all of the planning to achieve a certain level of sustainability. As the Eko-Viikki consumption results show, the demanded levels of PIMWAG-criteria were, in average, achieved. This outcome indicates that by demanding the use of these types of criteria could have a standardizing effect to the sustainability aspirations of urban planning, and thus, drive the issues forward in more effective manner. However, the interviewees considered the voluntary-based assessment tools and criteria also as important instruments that aid the sustainability aspirations in parallel with more regulative instruments, such as legislation.

Whether one thinks that these sustainability assessment criteria should be mandatory to use or not, it seems to be clear that there is a need to have a non-laborious and standardized tool that is viable also to the Finnish context. The mainstreaming of the indicator tools appears, according to the interviews of this thesis, to have been difficult worldwide as it demands extra resources compared to the regular construction. Since the RT-environmental tool was launched only a couple of years ago, in the spring 2017, it remains to be seen whether it can develop into the longed-for, standardized and non-laborious assessment tool.

Besides the couple of clearly viable policy instruments scaling up to the regime, the use of policy instruments in the Eko-Viikki neighbourhood development did not always manage to create optimal conditions for promoting the urban sustainability transition. The economic policy instruments in the area were minimal and focused only on funding instruments. The funding was received from scattered sources and no new instruments were developed particularly for the Eko-Viikki development. The lack of funding and other economic instruments might be explained by earlier research findings (Loorbach & Shiroyama, 2016); the current urban governance still chooses short-term economic growth over sustainability aims. Even though the sustainability agendas made by the city's governmental bodies are ambitious, it seems that sustainability issues are ideally driven forward without economic contribution from the city.

Information related policy instruments included a remarkably extensive follow-up documentation of the Eko-Viikki process. Still, one of the most notable challenges in Eko-Viikki was posed by communication issues. Accurate policy instruments for the dissemination of knowledge throughout the long chain of stakeholders in the Eko-Viikki area development were missing. These findings strengthen the earlier research of Staffans and Väyrynen (2009) which demonstrates that communication is interrupted in several faces in the Finnish land use planning and construction system because it is executed more as individual projects than processes. In Eko-Viikki, for example, the information of the special technological features in the housing was not effectively transmitted from the construction developers to the maintenance phase actors and ultimately to the residents.

When the area development is treated as a project, it is also dependent on individual people, that might change during the process (Staffans & Väyrynen, 2009). This was the case also in Eko-Viikki; when the janitors changed, the new employees did not have sufficient knowledge on the special technology. The Eko-Viikki case shows that a lack of proper communication can result in serious disadvantages. The technology was misused by the maintenance companies while the residents were

also ignoring the possibilities of the technological solutions. Altogether, it was found that the communication challenges had a negative effect on the aspirations to reduce the consumption levels of water, heating and electricity. Technology in itself is not enough, if people are unaware how to use it accurately and, moreover, why it would be beneficial to use it. According to Staffans & Väyrynen (2009) the process approach would allow more efficient communication between the different actors and phases of the area development. Evidently, in sustainability oriented urban planning, the need for efficient communication is intertwined with the need for strong collaboration models.

Furthermore, Staffans & Väyrynen (2009) state that if the area development is treated as a project, the learning is also targeted mainly to individual people, like it seems to have been the case in Eko-Viikki. As stated in the interviews, it seems that the Eko-Viikki case has probably increased the knowledge and expertise of individual urban planners involved in the process. Still, many of the interviewees noted that after Eko-Viikki similar types of sustainability focused area developments were lacking in Helsinki for a long time. This could be an indication that the city has not systematically used the knowledge and developed the methods gained in Eko-Viikki process in other area development projects. On the contrary, if the area development would be seen as a process, the organisations could continuously learn and develop their processes (Staffans & Väyrynen, 2009). As Loorbach and Shiroyama (2016) have stated, urban sustainability transitions need policy instruments that can take into consideration the complexities and uncertainties of the process. The methods of continuous learning and development inside the urban planning processes could address these needs.

Moreover, the development of process view and methods could address the lack of attention in the phases once the area is built, namely the maintenance and user phases. After the construction, the Eko-Viikki area was, as usual, left to live on with the responsibility of property owners, housing associations and residents. What is noteworthy; approximately 40% of all of the carbon dioxide emissions in the city of Helsinki are caused by housing and 85% of these housing emissions are, in turn, caused by the heating and 15% by the use of electricity (Helsingin kaupunki, 2015). These figures back up the need to pay more attention to the area development as a process, and especially maintenance and living phases. The city should seek for new ways to encourage and support the maintenance phase actors and residents to incorporate the sustainability issues in their work and behaviour. In line with this, more attention should be paid to the updating of the old building stock to meet today's sustainability standards, for example the ones for energy efficiency.

The examination of policy instruments and governance indicates that niche level policy experimentations are important, but so is the role of the urban planning regime and also other parts of the city organisation in order to promote sustainability transitions. Representatives of the current regime, the city planning department and the city office, had a pivotal role in the Eko-Viikki project and, therefore, they were actively contributing to the sustainability development of the urban planning. Outside the Eko-Viikki development, the governance related to the urban planning of Helsinki also changed during the examined time period. The city of Helsinki started to commit to different sustainability agendas, such as the Local Agenda 21, and set ambitious sustainability agendas itself as well.

Evidently, political commitment to ambitious sustainability agendas is needed, but in future, attention should also be turned to an efficient implementation of sustainability issues to the everyday urban planning practices. The recent master plan of Helsinki, with the ecological sustainability as one of the biggest goals for the city development, is a good step forward in advancing the sustainability related urban planning regulation. The interviews of this research, however revealed that the urban planning department employees still have varied knowledge and interest in executing sustainability in their work. Therefore, clearer guidelines to implement sustainability issues into to the urban planners' work are needed to unify the urban planning procedures. And, similarly, to meet the ambitious sustainability goals set, according to which, most importantly, Helsinki aims to be carbon neutral city by 2035.

The results of this thesis equally support Hendriks' (2014) statement, that it is important to recognise that "a city" and its governance are composed of several different actors that have all their influence on the steering of the urban governance in different ways. Interviewees of this study highlighted that urban planning actors alone have limited power to affect the urban sustainability in the system level as well as the city-wide decisions, that were seen as the most efficient way to spur sustainability issues. The discussions are in line with an earlier study of Säynäjoki et al. (2014), where the Finnish urban planning experts regarded environmental sustainability of urban areas as too complex issue for the urban planners to effectively develop on their own. The strategic decisions, made by the city government, city council and municipal boards, include for example the steering of the companies owned by the city. Especially, the importance of the energy production company of the City of Helsinki, and its commitment to sustainable energy solutions was highlighted in the interviews. Indeed, the importance of energy production should not be underestimated in the urban sustainability

aspirations; energy production account for 74% of all of the emissions in the region of Helsinki (Helsingin kaupunki, 2015).

Furthermore, the results of this thesis demonstrate the importance of actors operating outside the formal government and civil service departments. As stated above, the Eko-Viikki case displayed that the residents and maintenance companies had significant impact on the consumption results. Also Hendriks (2014) has previously stated that informal actors, even individual citizens, have significant influence in moulding the urban governance. Likewise, in the interviews the existing built-up areas and their changes were seen to be orchestrated by private actors that own the land, and therefore, the city cannot influence much on this. Hence, it could be pondered, as Hodson & Marvin (2009) previously did, to what degree private actors are nowadays controlling the city structure together with the official governing bodies. Ultimately, the city and its sustainability are composed, not only of the actions of civil service departments, but also of all the actions of different stakeholders of the urban areas.

At the same time, the importance of landscape level governance and use of policy instruments should not be understated in urban sustainability transitions. In the landscape level the clearest changes regarding the urban planning policies took place in the Land Use and Building Act that integrated the principles of sustainable development at a tightening pace and had a profound effect on what is nowadays considered as ambitious targets for sustainable construction. Næss & Vogel (2012) state that national-scale regulation is especially needed in urban sustainability transition to address the issue of the private market interest moulding the city environment. Supporting this statement, the interviewees considered that the Finnish construction industry's tendency to act mainly according to the minimum levels demanded in the official regulation should be addressed by stricter regulations.

Interestingly, the interviewees named two factors that had influenced the fast-paced changes in the legislation. Firstly, the tightening EU-directives, obviously, enforced the Finnish legislation to apply stricter regulations, concerning for example energy efficiency. Secondly, the niche level example of Eko-Viikki was seen as a proving ground that convinced the Ministry of the Environment of the possibility to change the legislation to a more stringent one, without a major social resistance, for example from the construction companies. This implies that area experimentation projects have, indeed, an important role in finding the most workable solutions for sustainable urban development.

However, as the interviewees stated, the land use and construction legislation changes have had the emphasis and strongest steering instruments on the energy efficiency of the buildings. Due to the tightened regulation the new buildings are already very energy efficient. By contrast, the old buildings, and energy efficiency levels even in Eko-Viikki buildings were considered as outdated in the interviews. As stated above, more attention should, therefore, be paid to regulating the renovation of existing infrastructure and building stock to meet the sustainability standards of the new building projects. Furthermore, the regulation should be extended to include, in addition to energy efficiency issues, also other issues that contribute to the sustainability of urban planning. As the interviewees told, such matters as the building material's footprint and life-cycle issues are slowly coming to the legislation, and for a reason. The importance of focusing on life-cycle thinking was already mentioned in the follow-up reports of Eko-Viikki (Helsingin kaupunginsuunnitteluvirasto, 2004). According to the reports, both public support instruments and specific tools for construction companies themselves for steering the lifecycle costs, are required. These instruments are needed in order to accommodate the longer timeframe, that is, inevitably, required in sustainability investments (Helsingin kaupunginsuunnitteluvirasto, 2004). Loorbach and Shiroyama (2016) have also highlighted the fact that urban sustainability transitions need long-term investments as well as decisions extending over the normal policy cycles.

All in all, the results of this thesis support the earlier findings acknowledging the importance of functional governance and policy instruments in guiding the urban areas towards sustainability (Næss & Vogel, 2012). The right policy instruments can act as a driving force in the transitions, and on the other hand, the lack of them as a hindering factor. As Loorbach and Shiroyama (2016) state, it is clear that no single governance structure or national, regional or local level can solve global sustainability issues on their own. Functional policy instruments should be used in all levels of the society. The results of this thesis support the ones by Loorbach and Shiroyama (2016); on their own, top-down policies are not enough. Also, policies and actions deriving from bottom-up, for example from the residents of the city, are needed. Indeed, transitions are seen in multi-level perspective (see e.g. Geels & Schot, 2004) as a result of interaction between different levels; pressures coming from both the sociotechnical landscape changes on the dominant regime and from the niche-innovations building up internal momentum (Geels & Schot, 2007). Hence, it should be acknowledged that the policies interact with each other and, therefore, their use affects other instruments in other levels.

5.2 Gradually progressing urban sustainability transitions

The importance of functional policy instruments in urban sustainability transitions was concluded in the first part of this chapter. This second part continues the discussion of this case study by examining evolvement of the different parts of the Helsinki urban planning regime as well as indications of a possible urban sustainability transition. However, as the assessment of transitions in the urban environments is said to be more complex task than that of sector-specific transitions (Næss & Vogel, 2012), the aim is not to provide absolute answers whether a transition has happened or not. Also, it should be noted that the assessment of urban transitions taking place, especially in current moment or only a short while ago, is said to be based on relative and qualitative judgements (Næss & Vogel, 2012).

Urban planning of Helsinki -case verifies the earlier research findings of Rotmans et al. (2001) which describe transition processes as a melange of multiple changes at different paces. The different domains of the regime, policy, markets, science, technology and culture, all have their own dynamics (Geels, 2011). When considering the case of urban planning of Helsinki, it can be stated that some changes towards sustainability are clearly visible. The major changes in Eko-Viikki, that took place during the period under examination, concern the policy and technology domains.

In the policy domain, the tightening land use and construction related legislation and ambitious sustainability agendas of the city have driven the urban sustainability issues forward. Also, the policy instruments focused on regulation and collaboration models have been scaled up from the Eko-Viikki development into the urban planning of Helsinki, which indicates that a certain level of policy innovation diffusion has happened. Still, as the first part of this chapter concluded, there is still a lot to be developed in the policy sphere if the ambitious sustainability targets are to be met on time. Concerning the technology domain, the interviewees highlighted that technological solutions for sustainable construction and land use have evolved enormously throughout the years. Technology was seen to have evolved from a hindering factor to an enabling factor. Technological and institutional changes are theorized by Rotmans et al. (2001) as characteristics of a system that are somewhere between the fast-changing flows and the slow-changing stocks. This study's findings contradict this theorization by showing that at least technological changes can be fast.

On the other hand, the domain consisting of culture and lifestyles would seem to lack behind the regulative and technological changes. In the interviews, especially the construction companies were blamed as conservative actors that still do not actively develop their practices into more sustainable ones. Furthermore, the residents' lifestyles and behaviour at their home, were acknowledged to play an important role in the proper use of technology and, therefore, in consumption reductions. This might be a hindering factor in the urban sustainability transitions, that has not been given enough attention before. These findings back up the Rotmans et al.'s (2001) view on cultures and lifestyles of being domains of complex systems that are slow to change. Because the whole system change is said to be eventually constrained by the slowest processes, the development of the stocks (Rotmans et al., 2001), more attention should be directed towards these domains.

Finally, the system domains that Rotmans et al. (2001) define to change relatively quickly are informational flows and economic changes. From the beginning of the Eko-Viikki project to the present day, the knowledge on sustainable urban planning has increased significantly. Eko-Viikki project has certainly had its role in raising the sustainability issues more into the discussion in the field. However, the information and economic domains were the ones that had also the most difficulties and, for the most part, lacked sufficient instruments in the Eko-Viikki case. Based on the results of this case, it seems that in order to accelerate urban sustainability transitions, more attention should be given to the creation of supportive financial incentives, as well as collaboration methods that would enable active communication all along the urban planning processes.

This melange of different dimensions of the regime describes well the inherent slowness of urban sustainability transitions that is connected to its characteristics of multidimensionality. The results of this thesis support the earlier research findings; the process of changing the whole infrastructural and social systems of a society is a slow process (see e.g. Geels, 2007; Næss & Vogel, 2012). Even though small alterations are constantly happening in the infrastructure of urban environments (Næss & Vogel, 2012), the existing building stock creates inertia and challenges to the urban transitions and their governance (Hodson & Marvin, 2009). At the moment, the renovation of the old building stock to meet the present-day sustainability standards is still a major challenge in Helsinki. The existing infrastructure creates path dependency (Næss & Vogel, 2012) as the decisions on the urban structure, for example on the master plans, still have effects after multiple decades. Hence, changing the already existing neighbourhoods and buildings is more challenging task than designing completely new sustainable neighbourhoods.

Even though the sustainable urban transitions are slow and complex, it is important to acknowledge the fact that transitions can, nevertheless, be somewhat steered. The results of this thesis suggest that the city of Helsinki was active in developing the Eko-Viikki and its niche innovations as the area development project was coordinated by it. Later on, the increasing amount of ambitious city goals concerning sustainability demonstrates the city's interest to make a change and steer the urban sustainability in organised manner. These findings confirm the earlier research findings in the sense that urban governments do recognise the importance of sustainability transitions and they actively try to change the regime with ambitious sustainability action plans (Hodson and Marvin, 2010). In the case of Eko-Viikki, the urban government as an incumbent actor, has made conscious and planned efforts to change the regime, as Smith et al. (2004) have theorised the possibilities of regime actors.

6 CONCLUSIONS

This master's thesis examined the policy instruments used in the multilevel governance of the Eko-Viikki neighbourhood, and also how these urban planning related instruments have changed afterwards. The aim was to find out which types of policy instruments could be essential in bringing about urban sustainability transitions and whether the dominant regime, in this case the urban planning of Helsinki, can actively influence the steering of the transition. Furthermore, the interest was to examine whether indications of an urban sustainability transition could be seen in the urban planning of Helsinki.

The examination of the policy instruments demonstrates that sustainability issues are, ever more strongly, taken into account in the urban planning policies. Out of the different policy instrument types, regulation and collaboration related instruments were the most successful in advancing the sustainability issues in the niche level of Eko-Viikki. The site transfer conditions containing sustainability demands as well as the area working group method have been scaled up to the use of the regime of urban planning of Helsinki. Furthermore, the city of Helsinki has committed to advance sustainable city development through international agreements, its own city strategies as well as environmental policies. It has, indeed, set a target to be carbon neutral city by 2035. Also, in the landscape level, the land use and construction legislation changes have remarkably tightened the requirements for sustainability of urban planning, especially for the levels of energy efficiency in buildings.

The results indicate, on the other hand, that the lack of certain types of instruments can remarkably hinder the urban sustainability transitions. For example, viable instruments to disseminate information to the maintenance and user phase actors were mostly missing in the Eko-Viikki development, which resulted in ignorance of technical solutions and, ultimately, higher consumption results. Information related instruments need, indeed, to be developed to make the most of the technical solutions available and, ultimately, to make urban planning more like continuous learning processes than individual projects. Moreover, the findings indicate that stronger economic instruments are needed to place sustainability issues as a first priority over short-term profit seeking in urban planning.

Systemic and process focused policy instruments and approaches are needed to take into account the multiple different stakeholders involved and governance levels where urban sustainability transitions take place. While the results indicate that the phases after building a specific area, namely maintenance and living phases, have a significant impact on the urban sustainability, it seems the city of Helsinki has addressed too little these phases by means of policy instruments. Similarly, attention should be directed not only to the planning and building of new sustainable neighbourhoods, but also to the maintenance and renovation of the old building stock to meet the present sustainability requirements. Only by addressing the life cycle issues in the urban areas can make them sustainable in the long run. In the policymaking, urban sustainability transitions require long-term investments and commitment that extends over the normal policymaking cycles.

All in all, the Eko-Viikki and Helsinki urban planning case example proves that it is important to pay attention to the different types of policymaking that affect the urban sustainability transitions in an intertwined manner in multiple different governance levels. The Eko-Viikki case and its policy instruments demonstrate that experimental development areas in the niche level are needed to try out new solutions. If the city is actively involved in the development process, the most suitable innovations can be scaled up to the regular land use planning and construction procedures. Also, it should be noted that the experimented solutions do not always work, but valuable knowledge can still be gained in the process.

Furthermore, the results of this thesis indicate that regime actors can, indeed, have endogenous power, to some extent, to steer the urban sustainability transitions. The regime actors of urban planning of Helsinki were active in the Eko-Viikki project, and sustainability issues have also become more integrated part of the everyday urban planning. However, there still remains the need to unify the procedures regarding sustainability related urban planning. More importantly, it should be noted that the governance affecting to the urban sustainability transitions does not consist only of actors in the urban planning, but includes also other governmental bodies of the city, construction companies, house maintenance companies and residents. While the governance even within the governmental bodies of the city itself involves a variety of different actors, the cooperation between different actors of the regime is vital. The transitions also seem to require strong political commitment to sustainability issues from the city in order to efficiently encourage and enforce action from the other relevant actors affecting the regime. This includes not only top-down regulative measures, but also enabling the bottom-up actions, for example from the residents that have an important role in urban sustainability transitions through their lifestyle and consumption choices.

Moreover, the landscape level governance and regulation, such as legislation, has also an important role in setting the sustainability issues as a priority in all of the actions taking place in the urban environments at the volume and speed required to accelerate of the much-needed urban sustainability transitions. Furthermore, national and international level regulation is needed to address the private market interest in the urban environment, because the construction industry in Finland is remarked to act mostly according to the official regulation, not by voluntary development.

However, as the need for urban sustainability transition has become ever more pressing, there are still steps to be taken by all the actors operating in the urban area in order to achieve ambition levels needed in, for what could be called, an urban sustainability transition. Based on the results from the Eko-Viikki and urban planning of Helsinki case, it cannot be said that urban sustainability transition would have happened. Instead, different dimensions of the transition have been evolving at different paces. More attention should be paid, primarily, to the dimensions that are evolving in a slower pace, in this case the domains of culture, markets and information, so that they do not become hindrances of the transition. Finally, it must be acknowledged that sustainability transitions are slow to develop in the urban environments because of the multiple actors involved and the inertia of urban infrastructure.

As for the analytical framework, multi-level perspective (MLP) on transitions was relatively well suited for this research and its purposes. It provided a good frame to examine the policy instruments in multiple governance levels as well as the interaction between these levels and their instruments. Moreover, it enabled an overall evaluation of the current state of urban planning of Helsinki and its sustainability. Combined with the slight criticism found in literature that was directed towards the role of the regime and its spatiality, the application of the analytical framework also provided interesting observations on the current challenges in the governance of the urban sustainability transition in the Finnish context. Furthermore, it provided verification that the role of the regime and its inside dynamics are vital in examining urban sustainability transitions.

For future research, more empirical case examples are needed to further analyse and theorize the role of the regime and its internal dynamics in urban sustainability transitions. It would, for example, be very interesting to use the transition management framework (see e.g. Loorbach, 2010) to study urban sustainability case examples in order to find more specific guidelines how the regime actors can steer and govern urban sustainability transitions. Furthermore, more practical case studies are needed on urban sustainability transitions and their governance to be able to compare the examples. This kind

of comparison could bring more information on the context specificity of these governance solutions, and about the possibilities of using the workable solutions elsewhere. Since the urban governments have not yet succeeded to govern the cities into profound sustainability transitions, obviously more information on the most viable policy tools are needed.

7 REFERENCES

- Alastalo, M. & Åkerman, M. (2010). Asiantuntijahaastattelun analyysi: faktojen jäljillä. In: Ruusuvoori, J; Nikander, P & Hyvärinen, M., 2010. Haastattelun analyysi. Vastapaino, Tampere.
- Barde, J. (1994). Economic instruments in environmental policy: Lessons from the OECD experience and their relevance to developing economies. OECD Development Centre. Working Paper No. 92. Available at: <http://www.oecd.org/dev/1919252.pdf> (accessed 10.8.2018).
- Eames, M., Dixon, T., May, T., & Hunt, M. (2013). City futures: Exploring urban retrofit and sustainable transitions. *Building Research and Information*, 41(5), 504-516.
- Ernst, L., de Graaf-Van Dinther, R. E., Peek, G. J., & Loorbach, D. A. (2016). Sustainable urban transformation and sustainability transitions; conceptual framework and case study. *Journal of Cleaner Production*, 112, 2988-2999.
- Eskola, J. (2001). *Laadullisen tutkimuksen juhannustaiat*. Laadullisen tutkimuksen analyysi vaihe vaiheelta. In: Juhani Aaltola & Raine Valli (edit.) Ikkunoita tutkimusmetodeihin II. Näkökulmia aloittelevalle tutkijalle tutkimuksen teoreettisiin lähtökohtiin ja analyysimenetelmiin. Jyväskylä. PS-kustannus, 133-157.
- Eskola, J. (2018). *Laadullisen tutkimuksen juhannustaiat*: laadullisen aineiston analyysi vaihe vaiheelta. In: Valli, R. (edit.) (2018). Ikkunoita tutkimusmetodeihin 2. Näkökulmia aloittelevalle tutkijalle tutkimuksen teoreettisiin lähtökohtiin ja analyysimenetelmiin. PS Kustannus. 5. uudistettu ja täydennetty painos.
- Frantzeskaki, N., Broto, V. C., Coenen, L., & Loorbach, D. (Eds.). (2017). *Urban sustainability transitions* (Vol. 5). Taylor & Francis.
- Geels, F. W. (2002). Technological transitions as evolutionary reconfiguration processes: A multi-level perspective and a case-study. *Research Policy*, 31(8-9), 1257-1274.
- Geels, F. W. (2004). From sectoral systems of innovation to socio-technical systems: Insights about dynamics and change from sociology and institutional theory. *Research Policy*, 33(6-7), 897-920.
- Geels, F. W. (2006). The hygienic transition from cesspools to sewer systems (1840–1930): The dynamics of regime transformation. *Research Policy*, 35(7), 1069-1082.
- Geels, F. W. (2011). The multi-level perspective on sustainability transitions: Responses to seven criticisms. *Environmental Innovation and Societal Transitions*, 1(1), 24-40.
- Geels, F. W., & Schot, J. (2007). Typology of sociotechnical transition pathways. *Research Policy*, 36(3), 399-417.

Helsingin kaupunginkanslia, talous – ja suunnitteluosasto, yleiskaavatoimisto (1992). Viheralueiden kestävän käytön mahdollisuudet tiivistyvässä kaupunkirakenteessa: Helsingin yleiskaava 1992:n arviointi. Kaupunginkanslian julkaisusarja A20/1992.

Helsingin kaupunki (1998). Helsingin Paikallisagenda 21-projekti, Raportti 1: Kestävän kehityksen teematyöryhmien ehdotukset. Helsingin kaupunginkanslian julkaisusarja A, A 13/1998.

Helsingin kaupunki (2002). Helsingin yleiskaava 2002, ehdotus, selostus. Helsingin kaupunkisuunnitteluviraston julkaisuja 2002:17, Kslk 17.6.2003. Available at: https://www.hel.fi/static/ksv/www/YK2002_selostus_1.pdf (accessed 21.1.2019)

Helsingin kaupunki (2003). Helsingin kestävän kehityksen toimintaohjelma-Paikallisagenda 21-projekti. Helsingin kaupunginkanslian julkaisusarja A 8/2003.

Helsingin kaupunki (2015). Helsingin ilmastotiekartta- kohti hiilineutraalia ja ilmastoon sopeutunutta kaupunkiamme. Available at: <https://dev.hel.fi/maatokset/media/att/c0/c08ed49dbad17914212107a8242a3f17c462f6b4.pdf> (accessed 5.10.2018).

Helsingin kaupunki & Ympäristöministeriö (2004). Eko-Viikki -Tavoitteet, toteutus ja tulokset. Available at: https://www.uuttahelsinki.fi/sites/default/files/legacy_files/eko-viikki.pdf (accessed 17.1.2019)

Helsingin kaupunkisuunnitteluvirasto (2004). Eko-Viikki: Seurantaprojektin loppuraportti. Available at: https://www.uuttahelsinki.fi/sites/default/files/inline-attachments/2017-02/eko-viikki_seurantaprojektin_loppuraportti_ksv_2004.pdf (accessed 17.1.2019)

Helsingin kaupunkisuunnitteluvirasto (2017). Kaupunkikaava; Helsingin yleiskaava. Available at: <https://www.hel.fi/hel2/ksv/julkaisut/esitteet/esite-2017-1-fi.pdf> (accessed 5.10.2018)

Helsingin kaupunkiympäristön toimiala (2017). Kaupunkimittauspalvelut. Helsingin kuntatietojärjestelmä. Available at: <https://www.avoindata.fi/data/fi/dataset/helsinki-alue-ja-ymparisto/resource/ae77766-a03b-4734-b323-20cbffa49a50> (accessed in 21.12.2018)

Helsingin kaupunkiympäristön toimiala (2018). Helsingin kaupungin ympäristöraportti 2017. Helsingin kaupungin keskushallinnon julkaisuja 2018:7. Available at: <https://www.hel.fi/static/ymk/yrap/fi/hki-ymparistoraportti-2017.pdf> (accessed 5.10.2018).

- Hendriks, F. (2014). Understanding good urban governance: Essentials, shifts, and values. *Urban Affairs Review*, 50(4), 553-576.
- Hodson, M., Geels, F. W., & McMeekin, A. (2017). Reconfiguring urban sustainability transitions, analysing multiplicity. *Sustainability*, 9(2), 299.
- Hodson, M., & Marvin, S. (2009). Cities mediating technological transitions: Understanding visions, intermediation and consequences. *Technology Analysis & Strategic Management*, 21(4), 515-534.
- Hodson, M., & Marvin, S. (2010). Can cities shape socio-technical transitions and how would we know if they were? *Research Policy*, 39(4), 477-485.
- Hyötyläinen, M. (2015). Uusliberaali kaupunkipolitiikka ja kuntien maankäyttö. *Yhteiskuntapolitiikka* 80:6. Available at: https://www.julkari.fi/bitstream/handle/10024/129588/YP1506_Hyotylainen.pdf?sequence=2 (accessed 21.11.2018)
- Jaakkola, M. (2012). Helsinki, Finland: Greenes and Urban Form. In: Beatley, T. (2012). *Green cities of Europe: global lessons on green urbanism*. Island Press.
- Jabareen, Y. R. (2006). Sustainable urban forms - their typologies, models, and concepts. *Journal of Planning Education and Research*, 26(1), 38-52.
- Jalkanen, R., Kajaste, T., Kauppinen, T., Pakkala, P. & Rosengren, C. (2017). *Kaupunkisuunnittelu ja asuminen*. Helsinki: Rakennustieto Oy.
- Johansson, Anna. (2009). Eko-Viikin käyttöjärjestelmien analyysi. Available at: <https://www.uuttahelsinki.fi/fi/esikaupungit/rakentaminen/esitteet-ja-julkaisut> (Accessed 12.3.2018)
- Joss, S. (2011). Eco-cities: The mainstreaming of urban sustainability - key characteristics and driving factors. *International Journal of Sustainable Development and Planning*, 6(3), 268-285.
- Joss, S. (2015). Eco-cities and sustainable urbanism. In J. D. Wright (Ed.), *International encyclopedia of the social & behavioral sciences (second edition)* (pp. 829-837). Oxford: Elsevier.
- Land Use and Building Act (Maankäyttö- ja rakennuslaki, MRL) 17.8.1990/ 696
- Land Use and Building Act (Maankäyttö- ja rakennuslaki, MRL) 5.2.1999/132
- Land Use and Building Act (Maankäyttö- ja rakennuslaki, MRL) 8.4.2005/202
- Land Use and Building Decree (Maankäyttö- ja rakennusasetus, MRA) 10.9.1999/895

- Loorbach, D. (2010). Transition management for sustainable development: a prescriptive, complexity-based governance framework. *Governance*, 23(1), 161-183.
- Loorbach, D., & Shiroyama, H. (2016). The challenge of sustainable urban development and transforming cities. *Governance of urban sustainability transitions* (pp. 3-12) Springer.
- Madlener, R., & Sunak, Y. (2011). Impacts of urbanization on urban structures and energy demand: What can we learn for urban energy planning and urbanization management? *Sustainable Cities and Society*, 1(1), 45-53.
- Mickwitz, P. (2003). A framework for evaluating environmental policy instruments: Context and key concepts. *Evaluation*, 9(4), 415-436.
- Motiva. (2008). Eko-Viikki- Tavoitteiden ja tulosten erot energiankulutuksessa. Available at: <https://www.uuttahelsinki.fi/fi/esikaupungit/rakentaminen/esitteet-ja-julkaisut> (Accessed 19.3.2018)
- Næss, P., & Vogel, N. (2012). Sustainable urban development and the multi-level transition perspective. *Environmental Innovation and Societal Transitions*, 4, 36-50.
- O'Brien, K., & Sygna, L. (2013). Responding to climate change: the three spheres of transformation. *Proceedings of Transformation in a Changing Climate*, 19-21.
- Quitau, M., Jensen, J. S., Elle, M., & Hoffmann, B. (2013). Sustainable urban regime adjustments. *Journal of Cleaner Production*, 50, 140-147.
- Rotmans, J., Kemp, R., & Van Asselt, M. (2001). More evolution than revolution: Transition management in public policy. *Foresight*, 3(1), 15-31.
- Seutu CD, 2018. Helsingin seudun ympäristöpalvelut HSY ja Helsingin kaupungin kuntarekisteri, kaupunginkanslian kaupunkitutkimus ja -tilastot.
- Staffans, A. & Väyrynen, E. (toim.) (2009). *Oppiva kaupunkisuunnittelu*. Arkkitehtuurin julkaisuja, no.98, Espoo. Available at: http://opus.tkk.fi/dokumentit/Tulokset_dokumentit/OPUS-kirja_web.pdf (accessed 9.10.2018)
- Suomen Arkkitehtiliitto SAFA (1997). Viikin ekokorttelit. Suunnittelukilpailut ja koerakentaminen. Helsingin kaupunki, Teknologian kehittämiskeskus Tekes, Ympäristöministeriö, Suomen Arkkitehtiliitto SAFA. Julkaisija: Suomen arkkitehtuuriliitto SAFA. Toimittaja: Pirjo-Pekkarinen Kanerva. Yliopistopaino, Helsinki.
- Säynäjoki, E., Heinonen, J., & Junnila, S. (2014). The power of urban planning on environmental sustainability: A focus group study in Finland. *Sustainability*, 6(10), 6622-6643.

- Säynäjoki, E., Heinonen, J., Rantsi J., Ristimäki, M., Nissinen, A., Seppälä J., Lahti, P. & Haapio, A. (2012). Kaupunkien ja kuntien aluetasoiset ekolaskurit: katsaus tarjolla oleviin ekolaskureihin. KEKO A väliraportti. Available at: https://www.syke.fi/fi-FI/Tutkimus_kehittaminen/Tutkimus_ja_kehittamishankkeet/Hankkeet/Kaupunkien_ja_kuntien_alueelliset_ekolaskurit_KEKO_A (accessed in: 17.1.2019)
- Tieteen termipankki, 2018. Estetiikka: kaupunkisuunnittelu. Available at: <http://www.tieteentermipankki.fi/wiki/Estetiikka:kaupunkisuunnittelu> (accessed 29.11.2018)
- Tuomi, J. & Sarajärvi, A. (2009). *Laadullinen tutkimus ja sisällönanalyysi*. Kustanneosakeyhtiö Tammi.
- Tuomi, J. & Sarajärvi, A. (2018). *Laadullinen tutkimus ja sisällönanalyysi*. Kustanneosakeyhtiö Tammi.
- Vedung, E. (1998). Policy instruments: Typologies and theories. In: Bemelmans-Videc, M.L., Rist, R.C. & Vedung, E. (edit.): *Carrots, sticks & sermons: policy instruments and their evaluation*. News Brunswick: Transaction Publishers 1998.
- Yin, R.K. (2014). *Case study research: design and methods*. Fifth edition. SAGE Publications, Inc.
- Ympäristöhallinto (2018a). Vaikutusten arviointi kaavoituksessa. Ympäristöhallinnon yhteinen verkkopalvelu. Available at: http://www.ymparisto.fi/fi-FI/Elinymparisto_ja_kaavoitus/Kaavoituksen_eteneminen/Vaikutusten_arviointi_kaavoituksessa (accessed 4.10.2018)
- Ympäristöhallinto (2018b). Valtakunnalliset alueidenkäyttötavoitteet; Valtioneuvoston päätös valtakunnallisista alueidenkäyttötavoitteista 14.12.2017. Ympäristöhallinnon yhteinen verkkopalvelu. Available at: [https://www.ymparisto.fi/fi-FI/Elinymparisto_ja_kaavoitus/Maankayton_suunnittelu/jarjestelma/Valtakunnalliset_alueidenkayttotavoitteet/Valtakunnalliset_alueidenkayttotavoitteet\(13419\)](https://www.ymparisto.fi/fi-FI/Elinymparisto_ja_kaavoitus/Maankayton_suunnittelu/jarjestelma/Valtakunnalliset_alueidenkayttotavoitteet/Valtakunnalliset_alueidenkayttotavoitteet(13419)) (accessed 11.3.2019)
- Ympäristöministeriö (2014). Arvio maankäyttö- ja rakennuslain toimivuudesta. Suomen Ympäristö 1/2014. Available at: [http://www.ym.fi/fi-FI/Ajankohtaista/Julkaisut/SY_12014_Arviointi_maankaytto_ja_rakennu\(28185\)](http://www.ym.fi/fi-FI/Ajankohtaista/Julkaisut/SY_12014_Arviointi_maankaytto_ja_rakennu(28185)) (accessed 21.1.2019)
- Ympäristöministeriö (2017a). Ympäristövaikutusten arviointia koskeva lainsäädäntö. Available at: http://www.ym.fi/fi-FI/Ymparisto/Lainsaadanto_ja_ohjeet/Ymparistovaikutusten_arviointia_koskeva_lainsaadanto (accessed 12.3.2019)

Ympäristöministeriö (2017b). Lähes nollaenergiarakentamisen lainsäädännön valmistelu. Available at: http://www.ym.fi/fi-FI/Maankaytto_ ja_ rakentaminen/Lainsaadanto_ ja_ ohjeet/Maankayton_ ja_ rakentamisen_ valmisteilla_ oleva_ lainsaadanto/Lahes_ nollaenergiarakentamisen_ lainsaadanto (accessed 22.8.2018)

Ympäristöministeriö (2018a). Maankäyttö- ja rakennuslain uudistus. Available at: [http://www.ym.fi/fi-FI/Maankaytto_ ja_ rakentaminen/Lainsaadanto_ ja_ ohjeet/Maankayton_ ja_ rakentamisen_ valmisteilla_ oleva_ lainsaadanto/Maankaytto_ ja_ rakennuslain_ uudistus/Maankaytto_ ja_ rakennuslain_ uudistus_ \(42391\)](http://www.ym.fi/fi-FI/Maankaytto_ ja_ rakentaminen/Lainsaadanto_ ja_ ohjeet/Maankayton_ ja_ rakentamisen_ valmisteilla_ oleva_ lainsaadanto/Maankaytto_ ja_ rakennuslain_ uudistus/Maankaytto_ ja_ rakennuslain_ uudistus_ (42391)) (accessed 22.8.2018)

Ympäristöministeriö (2018b). Rakennusten energiatehokkuutta koskeva lainsäädäntö. Available at: http://www.ym.fi/fi-FI/Maankaytto_ ja_ rakentaminen/Lainsaadanto_ ja_ ohjeet/Rakennuksen_ energiatehokkuutta_ koskeva_ lainsaadanto (accessed 22.8.2018)

Ympäristöministeriö (2018c) Kestävä kaupunkikehitys -uusi ohjelma rakentaa tulevaisuuden kaupunkeja. Available at: <http://www.ym.fi/kestavakaupunkikehitys> (accessed 27.9.2018)

APPENDIX 1: Question frames for the semi-structured interviews of this thesis

THE CITY EXECUTIVE OFFICE

Background of the interviewee & definition of the policy instruments:

- Could you briefly tell about your professional background?
- What was yours, and your organisation's role in the planning and construction process of Eko-Viikki?
- This interview focuses on the policy instruments used in Eko-Viikki. Could define, in your own words, what policy instruments in planning, construction and follow-up of a sustainable neighborhood mean?

Point of departure for planning a sustainable neighbourhood:

1. Was the point of departure in the planning of Eko-Viikki somehow different than planning the "regular" neighbourhoods? Was there more leeway or restrictions for some reason?
 - a. Why? What types of factors affected this (e.g. resources; funding, knowledge)?

Policy instruments:

2. What types of policy instruments have been used in the area? Can you name the most significant ones?
3. Were there any new policy instruments in Eko-Viikki project that are not normally used in land use planning and construction?
4. Was there some emphasis on the use of specific types of policy instruments; regulation, economic and informational instruments?
5. Did some of the already existing policy instruments limit or enable the repertoire of the policy instruments that could be used in Eko-Viikki?
 - a. For example, official regulation (such as laws) or some of the more informal practices of urban planning or construction industry?
6. Did some factors outside the policy instruments limit or enable the repertoire of policy instruments that could be used in Eko-Viikki, or the efficiency of their use?
 - a. For example: the available technology, the institutions and paradigms of science, politics and government, culture (socio-cultural values), users and markets?

7. Sustainable urban planning involves many different sectors, for example construction, land use and environmental protection fields. Was the consolidation of the policy steering between the different fields and their policy instruments challenging?

Evaluation of the Eko-Viikki project:

8. How did the goals and the execution meet?
 - a. Concerning the contents? Concerning the process?
9. What could have been done better?
10. Have the policy instruments used in Eko-Viikki or generally the learnings of the project been used later in urban planning?
 - a. If yes, how have they been used?

THE FINNISH ASSOCIATION OF ARCHITECTS (SAFA)

Background of the interviewee:

- What was yours, and your organisation's role in the planning, construction and/or follow-up process of Eko-Viikki?

The point of departure for planning a sustainable neighbourhood in the mid 1990's and nowadays:

1. Was the point of departure in planning Eko-Viikki somehow different than planning the "regular" neighbourhoods? Was there more leeway or restrictions for some reason?
 - a. Why? What factors affected this?
2. What were SAFA's goals for planning of Eko-Viikki?
 - a. For the contents? For the process?
3. How were the sustainability issues taken into account and executed in the Finnish architecture in the mid 1990's?
 - a. Has this changed throughout the years? Why?

Policy instruments:

4. Which types of policy instruments did SAFA use in order to advance the creation of a sustainable neighbourhood of Eko-Viikki?
 - a. Regarding the contents or the process?

5. Did some of the already existing policy instruments limit or enable the repertoire of policy instruments that could be used in Eko-Viikki?
 - a. For example, official regulation (such as laws) or some of the more informal practices of urban planning or construction industry?
6. Did some factors outside the policy instruments limit or enable the repertoire of policy instruments that could be used in Eko-Viikki, or their efficiency?
 - a. For example: the available technology, the institutions and paradigms of science, politics and government, culture (socio-cultural values), users and markets?

Evaluation of the Eko-Viikki project:

7. What kind of knowledge or methods did the planning, construction and follow-up process of Eko-Viikki bring to sustainable urban planning? How about to architecture?
8. Have the knowledge or methods been used later in the urban planning or in the architecture? If yes, how has it been used?
 - a. For example, generally the knowledge gained in the project, the viable policy instruments, technology?

THE MINISTRY OF THE ENVIRONMENT

Background of the interviewee:

- What was yours, and your organisation's role in the planning, construction and/or follow-up process of Eko-Viikki?

The Point of departure for planning a sustainable neighbourhood in the mid 1990's and nowadays:

1. What were the goals of the Ministry of the Environment for the planning of Eko-Viikki?
 - a. For the contents? For the process?
2. How were the sustainability issues taken into account and executed in urban planning and the political decision making in the mid 1990's, when Eko-Viikki planning was started?
 - a. Has this changed throughout the years? How? Why?

Policy instruments:

3. Which types of policy instruments did the Ministry of the Environment use in order to advance the creation of a sustainable neighbourhood of Eko-Viikki?
 - a. Regarding the contents or the process?
4. Did some of the already existing policy instruments limit or enable the repertoire of policy instruments that could be used in Eko-Viikki?
 - a. For example, official regulation (such as laws) or some of the more informal practices of urban planning or construction industry?
5. Did some factors outside policy instruments limit or enable the repertoire of policy instruments that could be used in Eko-Viikki or their efficiency?
 - a. For example: the available technology, the institutions and paradigms of science, politics and government, culture (socio-cultural values), users and markets?

Evaluation of the Eko-Viikki project:

6. What kind of knowledge or methods did the planning, construction and follow-up process of Eko-Viikki bring to sustainable urban planning? How about to the steering of sustainable urban planning in the national level?
7. Have the knowledge or methods been used later in the urban planning? If yes, then how has it been used?
 - a. For example, generally the knowledge gained in the project, viable policy instruments, technology?

THE DEPARTMENT OF URBAN PLANNING**Background of the interviewee:**

- What was yours, and your organisation's role in the planning, construction and/or follow-up process of Eko-Viikki?

The point of departure for planning a sustainable neighbourhood:

1. Was the point of departure in the planning Eko-Viikki somehow different than planning the "regular" neighbourhoods? Was there more leeway or restrictions for some reason?
 - a. Why? What factors affected this?

2. What were the goals of the Department of Urban Planning of Helsinki for the planning of Eko-Viikki?
 - a. For the contents? For the process?
3. How were the sustainability issues taken into account and executed in urban planning and the political decision making in the mid 1990's, when Eko-Viikki planning was started?
 - a. Has this changed throughout the years? How? Why?

Policy instruments:

1. Which types of policy instruments did the Department of the Urban Planning use in order to advance the creation of a sustainable neighbourhood of Eko-Viikki?
 - a. Regarding the contents or the process?
2. Did some of the already existing policy instruments limit or enable the repertoire of policy instruments that could be used in Eko-Viikki?
 - a. For example, official regulation (such as laws) or some of the more informal practices of urban planning or construction industry?
3. Did some factors outside the policy instruments limit or enable the repertoire of policy instruments that could be used in Eko-Viikki or their efficiency?
 - a. For example: the available technology, the institutions and paradigms of science, politics and government, culture (socio-cultural values), users and markets?

Evaluation of the Eko-Viikki project:

1. What kind of knowledge or methods did the planning, construction and follow-up process of Eko-Viikki bring to sustainable urban planning?
2. Have the knowledge or methods used later in the urban planning of Helsinki? If yes, how has it been used?
 - a. For example, generally the knowledge gained in the project, viable policy instruments, technology?
 - b. Can you name some of the new policy instruments, methods or techniques of Eko-Viikki that have been used later in the urban planning of Helsinki?

Future:

1. What types of policy instruments would you consider as necessary in the future in order to make sustainability issues be more accounted for in urban planning?
 - a. You can ponder this based on the policy instruments used in Eko-Viikki, or generally the policy steering of urban planning.

THE DIVISION OF URBAN ENVIRONMENT**Background of the interviewee:**

1. Could you tell shortly about your and your organisation's role in the urban planning and environmental protection of Helsinki?

Sustainability and cities:

2. How were the sustainability issues taken into account and executed in urban planning in the mid 1990's, when Eko-Viikki planning was started?
 - a. Has this changed throughout the years? How? Why?
3. What kind of goals the city of Helsinki has regarding to sustainability nowadays, and how these are reflected to the urban planning?

Policy instruments:

4. Which types of policy instruments is your organisation using to advance the creation of sustainable neighbourhoods and sustainable city development?
 - a. Regarding the contents or the process?
5. Are some of the already existing policy instruments limiting or enabling the repertoire of the policy instruments that could be used?
 - a. For example, official regulation (such as laws) or some of the more informal practices of urban planning or construction industry?
6. Are some factors outside policy instruments limiting or enabling the repertoire of policy instruments that can be used or their efficiency?
 - a. For example: the available technology, the institutions and paradigms of science, politics and government, culture (socio-cultural values), users and markets?

7. Sustainable urban planning involves many different sectors inside for example construction, land use and environmental protection fields. Is the consolidation of the policy steering between the different fields and their policy instruments challenging?
 - a. Has the founding of the Division of Urban Environment and the organisational reform of city of Helsinki had an impact on this?

Eko-Viikki's effect on the urban planning of Helsinki:

8. What kind of knowledge or methods did the planning, construction and follow-up process of Eko-Viikki bring to sustainable urban planning?
9. Do you know if the knowledge or methods of Eko-Viikki have been used later in the urban planning of Helsinki? If yes, then how has it been used?
 - a. For example, generally the knowledge gained in the project, viable policy instruments, technology?
 - b. Can you name some of the new policy instruments, methods or techniques of Eko-Viikki that have been used later in the urban planning of Helsinki?

THE WORKING GROUP CREATING PIMWAG-CRITERIA

Background of the interviewee:

1. What was yours, and your organisation's role in the planning, construction and/or follow-up process of Eko-Viikki?

New tool for measuring and definition of a sustainable neighbourhood:

2. Why was the PIMWAG-criteria compiled for the planning of Eko-Viikki?
3. What set it apart from other tools that were used for measuring and defining of a sustainable neighbourhood (e.g. BREEAM)?

Policy instruments:

4. Did some of the already existing policy instruments limit or enable the compiling and implementation of PIMWAG-criteria?

- a. For example, official regulation (such as laws) or some of the more informal practices of urban planning or construction industry?
- 5. Did some factors outside policy instruments limit or enable the compiling and implementation of PIMWAG-criteria?
 - a. For example: the available technology, the institutions and paradigms of science, politics and government, culture (socio-cultural values), users and markets?

Evaluation of the policy instrument

- 6. What kind of successes and challenges were faced in the compiling of the PIMWAG-criteria?
 - a. Regarding its content?
 - b. Regarding its implementation?
- 7. Has the PIMWAG-criteria been used in urban planning later on?
 - a. If yes, how has it been used?
- 8. If you would recompile now new criteria for the evaluation of the ecological sustainability of urban planning, would it differ somehow from the PIMWAG-criteria?